EXHIBIT C

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent of Shabtay et al.	§	REQUEST FOR *EX PARTE* REEXAMINATION
U.S. Patent No. 9,185,291	§	
Filed: Jun. 12, 2014	§	Attorney Docket No.: 52959.54X291
Issued: Nov. 10, 2015	§	Customer No.: 27683
Title: DUAL APERTURE ZOOM DIGITAL CAMERA	§	

REQUEST FOR *EX PARTE* REEXAMINATION

Mail Stop *Ex Parte* Reexam
Hon. Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Pursuant to the provisions of 35 U.S.C. §§ 302-307, Apple Inc. ("Requester") hereby requests an *ex parte* reexamination of claims 1-7, 10-14, 17, and 22 (the "Challenged Claims") of United States Patent No. 9,185,291 (the "'291 patent") that issued on Nov. 10, 2015, to Shabtay et al., resulting from Application 14/365,711, which was the National Phase of PCT application PCT/IB2014/062180 filed June 12, 2014, which claims priority from Provisional Application 61/834,486, filed June 13, 2013.

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I. INTRODUCTION

This is a request for *ex parte* reexamination of claims 1-7, 10-14, 17, and 22 (the "Challenged Claims") of the '291 Patent. This request presents substantial new questions of patentability not previously considered by the Office. The questions of patentability are both substantial and new with respect to the prosecution of the '291 Patent and with respect to a Petition for *Inter Partes* Review previously filed by Requester for claims 1-7, 10, and 12-13, but not instituted by the Office.

The combination of primary reference Golan in view of Parulski, as well as combinations further in view of Levey, Martin, Konno, and/or Baer, have not previously been presented to, or considered by, the Office regarding the '291 Patent. However, the combination of Golan in view of Parulski was recently found by the Patent Trial and Board (PTAB) to render obvious substantially similar claims of related U.S. Patent Nos. 9,661,233 (the "'233 Patent") and 10,326,942 (the "'942 Patent"), and likewise to render obvious substantially similar claims of commonly-owned ("co-invented and co-owned" as stated by PO) U.S. Patent Nos. 10,356,332 (the "'332 Patent") and 10,230,898 (the "'898 Patent").[1] The PTAB's findings in IPR2020-00487, IPR2020-00860, IPR2020-00861, and IPR2020-00862 demonstrate that a POSITA would have found it obvious to combine Golan and Parulski to arrive at the digital camera system recited in the Challenged Claims, as described in greater detail herein. The merits of the proposed rejections are strong, as evidenced by unpatentability decisions of the PTAB after trial for related patent claims.

As the Federal Circuit recently held, "a question of patentability is new until it has been considered and decided on the merits." *In re Vivint*, 14 F.4th 1342, 1350 (Fed. Cir. 2021). The questions of patentability against the Challenged Claims presented in this Request have not been

[1] *See* Ex.Q, IPR2020-00487 FWD (final written decision finding all challenged claims of the '233 Patent unpatentable), Ex.R, IPR-2020-00860 FWD (final written decision finding all challenged claims of the '942 Patent unpatentable), Ex.S, IPR2020-00862 FWD (final written decision finding all challenged claims of the '332 Patent unpatentable), and Ex.T, IPR2020-00861 FWD (final written decision finding all challenged claims of the '898 Patent unpatentable).

considered and decided on the merits. Similarly, the Request does not raise "the same or substantially the same prior art or arguments" against the Challenged Claims from any prior proceeding for purposes of discretionary consideration. 35 U.S.C. §325(d).

First, Golan alone, Golan in combination with Parulski, or Golan and Parulski in further combination with Levey, Martin, Konno, and/or Baer, each raises a substantial new question of patentability. None of the Parulski, Levey, Martin, Konno, and Baer references were considered during prosecution of the '291 Patent. Further, Golan is presented in a new light that escaped review during earlier examination. MPEP § 2216 ("The substantial new question of patentability may be based on art previously considered by the Office if the reference is presented in a new light or a different way that escaped review during earlier examination."). Although Golan was referenced by the Examiner in a "Citation of Pertinent Art" of a first action notice of allowance of the '291 Patent, (Ex.B, 392), it was never discussed for its teaching of *switching in video without fusion*, and was never presented in combination with Parulski, Levey, Martin, Konno, and/or Baer. Rather, the Examiner only characterized Golan's teachings as "an alternative embodiment that includes a fusion module that combines image information from the two cameras." *Id*. Requester shows below how Golan's teachings of ***switched video without fusion***, combined with Parulski, Levey, Martin, Konno, and/or Baer, discloses the allegedly allowable features (*e.g.*, fusion in still mode but not in video mode) of the Challenged Claims of the '291 Patent, and thus presents the disclosure of Golan in a new light that raises a substantial new question of patentability.

Second, the combination of Golan in view of Parulski in this Request is ***not*** the same as or substantially the same as the combination of Parulski in view of Christie and Golan presented in the petition against the '291 Patent in IPR2018-01348. In IPR2018-01348, Golan was ***not*** considered by the Board at all. Specifically, the Board denied the petition based solely on its finding that "Petitioner ha[d] not shown a reasonable rationale for combining Parulski and Christie." The Board ***explicitly stated*** that it "[did] ***not consider***" a ground such as the "combination of Parulski and Golan without Christie." Ex.X, IPR2018-01348, Decision Denying Institution, 16. Thus, all grounds presented in IPR2018-01348 necessarily relied upon Christie, and the PTAB denied the petition solely based on lack of motivation to combine Parulski with Christie.

By contrast here, this Request does not rely upon Christie at all and does not rely upon Parulski as the primary reference. Instead, the Request relies on Golan as the primary reference, and relies on the combination of Golan in view of Parulski ***without*** Christie. As such, the Golan/Parulski combination presented here is substantially different from IPR2018-01348, where Golan was presented only as a tertiary reference to be combined with Parulski in view of Christie, and Golan was never considered by the Office in IPR2018-01348.

Moreover, this request presents new, noncumulative teachings of the prior art with additional combination with Martin for claim 3, Konno for claim 7, and Baer for claim 22 that were not in IPR2018-01348. While the petition in IPR2018-01348 presented Konno to combine with Parulski, Christie, and Golan for claims 6-8, Konno was ***not*** considered by the Board at all. Ex.X, IPR2018-01348, Decision Denying Institution, 16.

Thus, as to the Challenged Claims of the '291 patent, this Request presents new, noncumulative teachings of the prior art with the combination of Golan and Parulski, none of which "has been considered and decided on the merits." *See In re Vivint*, 14 F.4th at 1350. Furthermore, while these challenges are newly presented against the Challenged Claims of the '291 Patent, the merits of the challenge are strongly supported by the PTAB's findings relying upon Golan in view of Parulski to find unpatentable substantially similar claims of related and/or co-invented patents in IPR2020-00487, IPR2020-00860, IPR2020-00861, and IPR2020-00862.

For these reasons, this Request is being filed now to provide the Office the opportunity to consider and apply the PTAB's findings relying upon Golan in view of Parulski to the Challenged Claims. Requester respectfully requests that the Office grant this Request and reject the Challenged Claims for the reasons presented herein.

II. IDENTIFICATION UNDER 37 C.F.R. § 1.510(B)(2) OF CLAIMS FOR WHICH REEXAMINATION IS REQUESTED AND CITATION OF PATENTS AND PRINTED PUBLICATIONS PRESENTED TO PROVIDE A SUBSTANTIAL NEW QUESTION OF PATENTABILITY

Requester identifies claims 1-7, 10-14, 17, and 22 of the '291 Patent for which reexamination is requested in view of the following references:

Exhibit F	U.S. Patent Application Publication No. 2012/0026366 to Golan et al. ("**Golan**"), published February 2, 2012.
Exhibit G	U.S. Patent No. 7,859,588 ("**Parulski**"), published September 11, 2008, and issued December 28, 2010.
Exhibit K	Japanese Patent Application Pub. No. JP2013106289 to Konno et al., Certified English translation ("**Konno**"), published May 30, 2013.
Exhibit M	U.S. Patent App. Pub. No. 2012-0019704 to Levey ("**Levey**"), published Jan. 26, 2012.
Exhibit L	U.S. Patent No. 8,081,206 to Martin et al. ("**Martin**"), published Sep. 14, 2006, and issued Dec. 20, 2011.
Exhibit O	U.S. Patent No. 7,112,774 to Baer ("**Baer**"), published Apr. 14, 2005, and issued Sep. 26, 2006.

Golan, Parulski, **Levey**, **Martin**, **Konno, and Baer** are prior art to the '291 Patent under at least post-AIA 35 U.S.C. §102(a)(1),[2] and not subject to an exception under §102(b)(1).

III. RELATED PROCEEDINGS

A. *Inter Partes* Review Proceedings

Substantiality of the new questions of patentability presented herein is confirmed by the Office itself relative to PTAB proceedings for several related patents and corresponding claims/limitations thereof. **First**, the proceedings summarized below establish that, while Requestor had not previously presented a Golan in view of Parulski challenge as to Challenged Claims of the '291 Patent, when such a challenge was presented for related/co-invented and co-

[2] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112, amended 35 U.S.C. § 102 to its current, post-AIA version. AIA § 3(b). The post-AIA version became effective on March 16, 2013 and applies to any patent issuing from an application that contains (or ever contained) "a claim to a claimed invention that has an effective filing date that is on or after [that date]." AIA §§ 3(n), 3(n)(1)(B). As the '291 Patent issued on an application that contains a claim claiming a priority date after March 16, 2013, citations herein are to the post-AIA version.

owned patents (the ’233, ’942, ’898 and ’332 Patents) and corresponding claims thereof, trials were *instituted* and the corresponding claims were *held unpatentable* under grounds that rely on a combination of Golan and Parulski for the disclosure and teachings relied upon herein. **Second**, additional corresponding dependent claims were, in the proceedings summarized below for the related/co-invented and co-owned ’233, ’942, ’898 and ’332 Patents, also *held unpatentable* grounds involving Levey, Martin, Konno, and Baer, as relied upon herein. **Third**, there is substantial overlap between the judges of the PTAB panel that expressly indicated that it did not consider a Golan-based ground in IPR2018-01348 for the ’291 Patent and those of the panels that later rendered final written decisions holding all challenged claims unpatentable in IPR2020-00487, IPR2020-00860, IPR2020-00861, and IPR2020-00862.[3] Therefore, the Office itself, when presented with new Golan and Parulski-based grounds such as now presented herein, found those grounds to be substantial. Indeed, the Board found claims of similar features to be unpatentable in final written decisions under new Golan and Parulski-based grounds notwithstanding both the higher burdens of persuasion (at institution *and* final decision) and the more demanding claim construction standard of *inter partes* review proceedings. The related proceedings are now summarized.

1. Apple Inc. v. Corephotonics LTD, IPR2018-01348, review not instituted for claims 1–7, 10, and 12–13 of the ’291 Patent.

In IPR2018-01348 for the ’291 Patent, Petitioner Apple challenged claims 1-5, 10, and 12-13 as obvious over Parulski in view of Christie and Golan, and challenged claims 6-7 as obvious over Parulski in view of Christie, Golan, and Konno. Ex.V, IPR2018-01348, Petition, 8. The Board denied institution based on its finding that “Petitioner has not shown a reasonable rationale for combining Parulski and Christie” for claim 1. The Board’s decision was made ***without*** considering Golan or any combination therewith. Ex.X, IPR2018-01348, Decision Denying Institution, 16.

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[3] IPR2018-01348 (’291 Patent) before Judges Hoff, Moore and Ullagaddi; IPR2020-00487 (’233 Patent) before Judges Moore, Anderson and Ullagaddi; IPR2020-00860 (’942 Patent) before Judges Moore, Ullagaddi and Kenny; IPR2020-00861 (’898 Patent) and IPR2020-00862 (’332 Patent) each before Judges Moore, Ullagaddi and Dougal.

2. *Apple Inc. v. Corephotonics LTD, IPR2020-00487, claims 1–18 of ’233 Patent, a continuation of the ’291 Patent, held unpatentable.*

In IPR2020-00487, the Board found that all challenged claims of the ’233 Patent are unpatentable.

The Board found claims 7 and 16 of the ’233 Patent unpatentable over Golan in view of Martin, relying on Golan to disclose features recited therein that are substantially similar to features recited in claim element [1.6] of the ’291 Patent. Ex.Q, IPR2020-00487 FWD, 47-49.

Further, the Board found claims 9 and 18 of the ’233 Patent unpatentable over Golan in view of Martin and Parulski, relying on Parulski to disclose features recited therein that are substantially similar to features recited in claim 11 of the ’291 Patent: “*wherein the camera controller configuration to provide video output images during switching between a lower ZF value and a higher ZF value or vice versa includes a configuration to use at high ZF secondary information from the Wide imaging section and to use at low ZF secondary information from the Tele imaging section*.” Ex.Q, IPR2020-00487 FWD, 55-56.

3. *Apple Inc. v. Corephotonics LTD, IPR2020-00860, claims 1–25 of ’942 Patent, a continuation of the ’291 Patent, held unptatentable.*

In IPR2020-00860, the Board found that all challenged claims of the ’942 Patent are unpatentable.

The Board found claims 6–8 and 24-25 of the ’942 Patent unpatentable over Golan in view of Martin and Parulski, relying on Parulski to disclose:

- claims 6-7 and 24-25 of the ’942 Patent, which recite features substantially similar to those recited in claims 9 and 18 of the ’322 Patent and in claim 11 of the ’291 Patent.
- claim 8 of the ’942 Patent, reciting “*wherein the Tele lens includes a ratio of total track length (TTL)/effective focal length (EFL) smaller than 1*,” (Ex.R, IPR2020-00860 FWD, 63-70), which is substantially similar to the features recited in claim 6 of the ’291 Patent.

The Board also found claims 10, 14, and 16 of the ’942 Patent unpatentable over Golan in view of Martin, Soga, and Baer, relying on Baer to disclose:

- “*wherein the camera controller is further configured to synchronize the Wide and Tele sensors so that a rolling shutter starts substantially the same time for both sensors*”

(Ex.R, IPR2020-00860 FWD, 74-76), which is substantially similar to the features recited in claim 22 of the '291 Patent.

4. *Apple Inc. v. Corephotonics LTD, IPR2020-00862, claims 1, 2, 5, 9–14, 17, 21, and 22 of '332 Patent, "co-invented and co-owned" with the '291 Patent, held unpatentable.*

In IPR2020-00862, the Board found that all challenged claims of the '332 Patent are unpatentable.

The Board found claim 11 of the '332 Patent unpatentable over Golan in view of Martin, Togo, and Parulski, relying on Parulski to disclose features substantially similar to features recited in claim 6 of the '291 Patent. Ex.S, IPR2020-00861 FWD, 68-69.

The Board found claim 22 of the '332 Patent unpatentable over Golan in view of Martin, Togo, and Parulski, relying on Parulski to disclose:

- "*the step of configuring the camera controller* ***to combine in still mode****, at a predefined range of ZF values, at least some of the Wide and Tele image data* ***to provide a fused output image*** *includes configuring the camera controller to combine Wide and Tele image data only in focused areas*" as recited in claim 22 of the '332 Patent, (Ex.S, IPR2020-00862, FWD, 69), which is substantially similar to the features recited in claim limitation [1.4.1] and claim 17 of the '291 Patent.

Regarding combination of Golan and Parulski, the Board stated, "[as] to Golan and Parulski, Petitioner contends a person of ordinary skill 'would have been motivated to apply Parulski's teachings of still mode fusion to a still mode of Golan, while in video mode, maintaining Golan's design choice of video switching (e.g., for the benefit of reduced computation power of video switching over video fusion).' ***We agree*** …." Ex.S, IPR2020-00862 FWD, 69 (emphasis added).

Further, the Board found claim 10 unpatentable over Golan, Togo, Martin, and Levey, relying on Martin to disclose "a user-selected region of interest." Ex.S, IPR2020-00862 FWD, 62.

5. *Apple Inc. v. Corephotonics LTD, IPR2020-00861, claims 1, 4, 8–12, 15, 19, 20 of ’898 Patent, “co-invented and commonly owned” with the ’291 Patent, held unptatetable.*

In IPR2020-00861, the Board found that all challenged claims of the ’898 Patent are unpatentable.

The Board found claims 10 and 20 of the ’898 Patent unpatentable over Golan in view of Martin, Togo, and Parulski, relying on Parulski to disclose the recited features that are substantially similar to the features recited in claims 11 and 22 of the ’332 Patent. Ex.T, IPR2020-00861 FWD, 67-71. The Board further found claim 9 of the ’898 Patent unpatentable over Golan in view of Martin, Togo, and Levey, relying on Martin to disclose to “a user-selected region of interest.” *Id.*, 58-61.

B. Litigation Involving the ’291 Patent

The ’291 patent is also the subject of ongoing litigation, namely, *Corephotonics, Ltd. v. Apple Inc.*, Case No. 5:17-cv-06457 (N.D. Cal. 2017) (“the ’291 Litigation”). The district court *sua sponte* stayed the ’291 Litigation. Order Sua Sponte Staying Cases Pending Resolution of IPR Proceedings (Ex.U).

IV. CERTIFICATION REGARDING NO ESTOPPEL

In accordance with 37 C.F.R. §1.510(b)(6), Requester hereby certifies that the estoppel provisions of 35 U.S.C. §315(e)(1) or 35 U.S.C. §325(e)(1) do not prohibit Requester from filing this *ex parte* reexamination request. While Requester previously filed a Petition challenging claims 1–7, 10, and 12–13 of the ’291 Patent, that *inter partes* review did not result in a final written decision under section 318(a), and thus, Requester is not estopped. *See* Ex.X, IPR2018-01348, Decision Denying Institution. Finally, no other *inter partes* or post-grant review petition has resulted in a final written decision or, indeed, has even been filed by Requestor or any other party.

V. THIS REQUEST IS NOT REDUNDANT AND SHOULD NOT BE DENIED UNDER 35 U.S.C. §325(d).

As discussed below, this Request raises substantial new questions of patentability with respect to the Challenged Claims based on the combination of Golan in view Parulski for claims 1-2, 4-6, 10-14, and 17, and with further combinations involving Levey, Martin, Konno, and/or Baer for claims 3, 6-7, and 22 respectively.

Although Golan was referenced by the Examiner in connection with a first action notice of allowance, it was never considered for its teaching of switching in video without fusion, or in combination with Parulski, Levey, Martin, Konno, and/or Baer. Indeed, the only hint as to the Examiner's perspective on Golan appears in the Notice of Allowability at p. 7 (Ex.B, 392) and does not indicate any appreciation by the Examiner of switched video without fusion teachings relied upon here in the present reexamination request. Rather, the Examiner seems to characterize Golan's teachings as "an alternative embodiment that includes a fusion module that combines image information from the two cameras." *Id.* Thus, it was error (in an *Advanced Bionics* sense) for the Office to allow claims of the '291 Patent without consideration of Golan's teaching of switched video without fusion and without considering Golan in combination with Parulski, Levey, Martin, Konno, and/or Baer. *See Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 at 10 (PTAB Feb. 13, 2020) (precedential) (applying 325(d) and factors under *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 at 17–18 (PTAB Dec. 15, 2017) (precedential)); *see also* MPEP 2216 ("The substantial new question of patentability may be based on art previously considered by the Office if the reference is presented in a new light or a different way that escaped review during earlier examination.").

Likewise, in IPR2018-01348 of the '291 Patent, which has been discussed above relative to the substantial new question inquiry, the combination of the primary reference Golan in view of Parulski, together with further combinations with Levey, Martin, Konno, and/or Baer, was ***not*** previously presented to the Office. The Board's decision denying institution of trial in IPR2018-01348 indeed confirmed that the combination of Golan in view of Parulski advanced herein was neither ***presented*** nor ***considered***, because the Board ***explicitly stated***, "As to the combination of Parulski and Christie with Golan, Petitioner ***does <u>not</u> rely on a combination of Parulski and***

Golan without Christie to meet the "***without fusion***" limitations of claim 1 (Pet. 20–22, 43–50) and, thus, ***we do not consider such a ground***." Ex.X, IPR2018-01348, Decision Denying Institution, 16. Moreover, it would have then been error (in an *Advanced Bionics* sense) for the Office to fail to consider Golan's teaching of switched video without fusion if the CRU were to now determine, *ex post* and contrary to the Board's clear statement to the contrary, that such teachings of Golan (switched video without fusion) had been previously presented in combination with Parulski and/or in combination with Levey, Martin, Konno, and/or Baer.

Such error would be further confirmed by the Board's subsequent final written decisions holding claims of other patents with similar features *unpatentable* under grounds that rely on a combination of Golan and Parulski for the disclosure and teachings described above. *See* Section III.A. Of particular note regarding now-proposed rejections of the '291 patent claims, in its final written decision holding all challenged claims of the '332 patent unpatentable,, the Board stated:

> "As to Golan and Parulski, Petitioner contends a person of ordinary skill 'would have been motivated to apply Parulski's teachings of still mode fusion to a still mode of Golan, while in video mode, maintaining Golan's design choice of video switching (e.g., for the benefit of reduced computation power of video switching over video fusion).' ***We agree*** …."

Ex.S, IPR2020-00862 FWD, 69 (emphasis added).

The combination of Golan in view of Parulski in this Request is ***not*** the same as or substantially the same as the combination of Parulski in view of Christie and Golan presented in IPR2018-01348. **First**, this Request relies on Golan as the primary reference, and relies on the combination of Golan in view of Parulski ***without*** Christie. As such, it is substantially different from IPR2018-01348, where Golan was presented as a tertiary reference applied to the combination of Parulski in view of Christie. In contrast, the starting point for the combination here, which is Golan's imaging system providing without fusion video output images, is completely different from the starting point in IPR2018-01348, which was Parulski's imaging system providing a fused still image. Moreover, the Petition in IPR2018-01348 relied on Christie's teachings that "still image capture options such as high dynamic range or 'HDR' images are not available for a video camera," to teach the claimed feature of fusion in still mode and without fusion in video. Ex.V, IPR2018-01348 Petition, 13-14. In contrast, this Request relies on Parulski itself and alternatively/additionally on the combination of Golan and Parulski

(as confirmed by the Board in subsequent proceedings) to teach that feature. *See* VII.A.4.[1.4.3]. **Second**, in IPR2018-01348, Golan was ***not*** considered by the Board at all, much less as a primary reference. Specifically, the Board denied the petition only based on its finding that "Petitioner has not shown a reasonable rationale for combining Parulski and Christie," and explicitly stated that it "[did] ***not*** consider such a ground" of "a combination of Parulski and Golan without Christie." Ex.X, IPR2018-01348, Decision Denying Institution, 16. Thus, this Request presents new, noncumulative teachings of the prior art with the combination of Golan and Parulski. **Third**, this request presents new, noncumulative teachings of the prior art with additional combination with Levey and Martin for claim 3, Konno for claim 6-7, and Baer for claim 22.

Thus, this Reexamination Request should **not** be rejected under 35 U.S.C. §325(d) because "the same or substantially the same prior art or arguments" were *not* previously presented to the Office with respect to claims 1-7, 10, and 12-13. *See* 35 U.S.C. §325(d). Moreover, even if the Office were to deem such art/arguments to have been presented, the art/arguments were not considered relative to the Challenged Claims of '291 patent, and Requester has demonstrated material error insofar as the Office would have had to have misapprehend or overlook the combined teachings of Golan in view of Parulski (if presented) as subsequently demonstrated by final written decisions finding related claims based on Golan and Parulski-based grounds. *See Advanced Bionics*, Paper 6 at 8 (establishing two-part framework in which material error is to be considered relative to previously presented art/arguments). Finally, relative to dependent claims 11, 14, 17, and 22, no prior art or arguments have been presented post-issuance, let alone the substantial, new and non-cumulative rejections proposed herein based on Golan in view of Parulski or Golan and Parulski further in view of Baer. Accordingly, the discretion described in § 325(d) does not apply.

VI. STATEMENT POINTING OUT SUBSTANTIAL NEW QUESTIONS OF PATENTABILITY

A. Overview of the ’291 Patent

The ’291 Patent is titled “Dual Aperture Zoom Digital Camera” and issued November 10, 2015. Ex.A, Title. The ’291 Patent is directed to a “dual-aperture zoom digital camera operable in both still and video modes.” Ex.A, Abstract; Ex.D, ¶24.

The ’291 Patent acknowledges that use of “**multi-aperture** imaging systems to approximate the effect of a zoom lens **are known**.” Ex.A, 1:49-50; Ex.D, ¶25. However, the ’291 Patent alleges that none of the known art references “provide a thin (e.g., fitting in a cell-phone) dual-aperture zoom digital camera with fixed focal length lenses, the camera configured to operate in both still mode and video mode to provide still and video images, wherein the camera configuration uses partial or full fusion to provide a fused image in still mode and does not use any fusion to provide a continuous, smooth zoom in video mode.” Ex.A, 3:7-13; Ex.D, ¶25.

As an alleged solution, the’291 Patent describes a dual-aperture digital camera including “a Wide Sub-camera and a Tele Sub-camera” and can “be operated in both still and video modes.” Ex.A, 3:22-35; Ex.D, ¶26. “In still mode, zoom is achieved ‘with fusion’ (full or partial), by fusing W and T images, with the resulting fused image including always information from both W and T images.” Ex.A, 3:36-38; Ex.D, ¶26. “In video mode, optical zoom is achieved ‘without fusion,’ by switching between the W and T images to shorten computational time requirements, thus enabling high video rate.” Ex.A, 3:42-44; Ex.D, ¶26.

FIG. 1A below illustrates a dual-aperture zoom imaging system 100 including Wide and Tele imaging sections, each having a respective lens, image sensor, and ISP. Ex.D, ¶27. FIG. 2 illustrates through exemplary images, a larger FOV for the Wide image provided by Wide sensor 202 and a smaller FOV for the corresponding Tele image provided by Tele sensor 110.

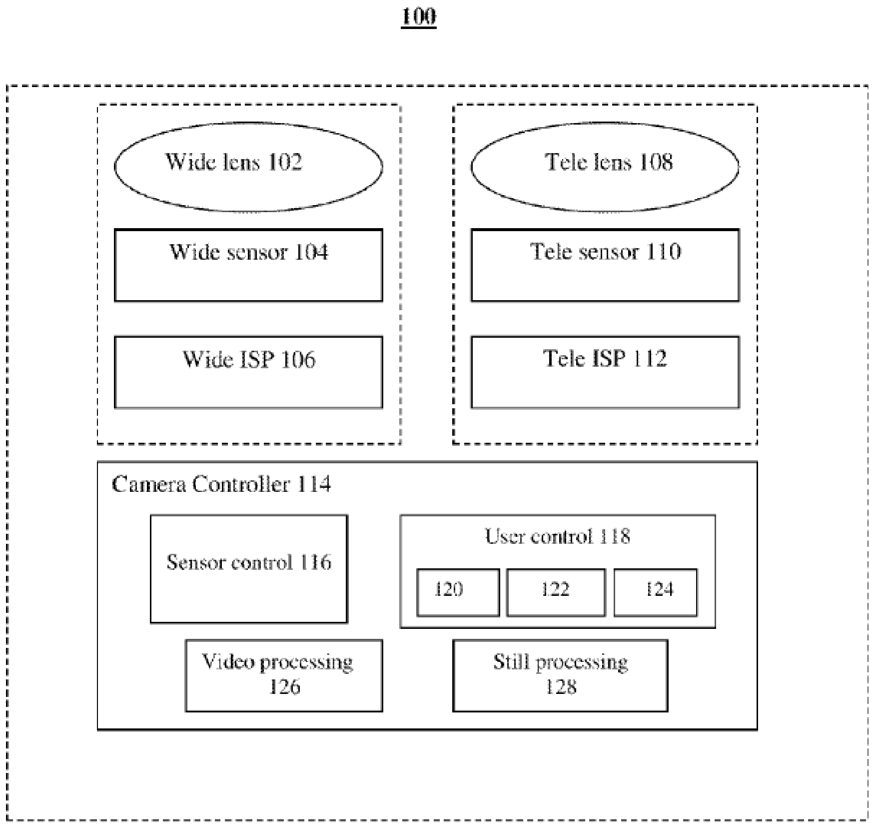


FIG. 1A

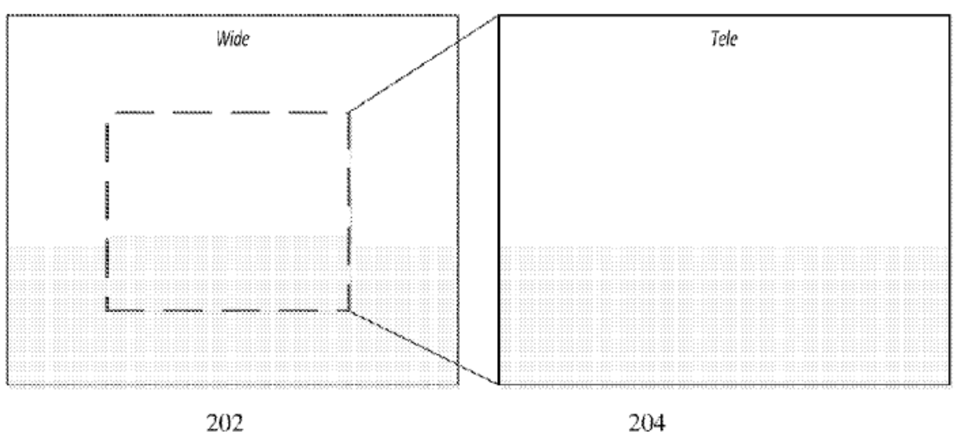


FIG. 2

Ex.A, ’291 Patent, FIGS. 1A and 2

However, as demonstrated below, and confirmed by Dr. Durand (Ex.D), it was well-known, before the effective filing date of the ’291 Patent, to provide a zoom digital camera using

1) Wide and Tele imaging sections to provide two images, and 2) a camera controller to provide, in still mode, a fused output image by combining the two images and, to provide, in video mode, continuous zoom output images without fusion. Ex.D, ¶28.

B. Prosecution History of the '291 Patent

The '291 Patent issued from Application 14/365711 ("'711 App"), which was the National Phase of PCT application PCT/IB2014/062180 filed June 12, 2014, which claims priority from Provisional Application 61/834,486 ("'486 App"), filed June 13, 2013. Ex.B, 17; Ex.C; Ex.D, ¶29. All of the prior art cited in the proposed rejections predates June 13, 2013.

The prosecution history is short. On September 25, 2015, Examiner issued a first action Allowance with Examiner amendment to claim 21 to correct typographical errors. Ex.B, 382-388; Ex.D, ¶30. Stated of reasons for allowance were that the prior art did not teach or fairly suggest limitations of part (c) of claim 1 regarding a camera controller and part (b) of claim 12 regarding configuring the camera controller. Ex.B, 388-389.

On September 29, 2015, the Applicant filed a post-allowance amendment to correct "minor and obvious dependency errors in claims 7, 8, and 9." Ex.B, 437-443; Ex.D, ¶31. The '291 Patent issued November 10, 2015.

C. Claim Construction

The '291 patent is not expired. Thus, this Request analyzes the claims according to its broadest reasonable interpretation in light of the specification. MPEP 2258 § I.G. For the purposes of this Request, Requester submits that all terms should be given their broadest reasonable interpretation. No express construction is necessary for this proceeding to show the unpatentability of the claims. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (construing terms "only to the extent necessary to resolve the controversy"); MPEP § 2111.01.

D. Definition of a Person of Ordinary Skill in the Art

A Person of Ordinary Skill in the Art ("POSITA") at the time of the claimed invention would have a bachelor's or the equivalent degree in electrical and/or computer engineering or a related field and 2-3 years of experience in imaging systems including optics and image

processing. Ex.D, ¶¶14-18. A person with less formal education but more experience, or more formal education but less experience, could have also met the relevant standard for a POSITA. *Id.*

E. Summary of Proposed Rejections Based on Prior Art Patents and Printed Publications

In accordance with 37 C.F.R. § 1.510(b)(3), reexamination of claims 1-7, 10-14, 17, and 22 (the "Challenged Claims") of the '291 patent is requested based on the following proposed rejections:

Proposed Rejections	**Claims**	**Basis**
1	1-2, 4-6, 10-14, and 17	Obvious under post-AIA 35 U.S.C. §103 over **Golan** in view of **Parulski**.
2	3	Obvious under §103 over **Golan** in view of **Parulski, Levey,** and **Martin.**
3	7	Obvious under §103 over **Golan** in view of **Parulski** and **Konno.**
4	22	Obvious under §103 over **Golan** in view of **Parulski** and **Baer**.

F. Identification of Substantial New Questions of Patentability

In this Request, substantial new questions (SNQs) of patentability are raised as set forth below.

1. The Combination of Golan in view of Parulski Raises a Substantial New Question of Patentability.

The Office has not considered the combination of Golan in view of Parulski, as presented in this Request. **First**, Parulski and the combination of Golan and Parulski were each not considered during prosecution of the '291 Patent.

Second, Golan is presented in a new light that escaped review during earlier examination. During prosecution, the Office simply referenced Golan in "Citation of Pertinent Art," only characterizing Golan's teachings as "an alternative embodiment that includes a ***fusion*** module that combines image information from the two cameras." Ex.B, 392. Requester shows below how Golan's teachings of switched video ***without fusion***, combined with Parulski, discloses the allegedly allowable features including the fusion in still mode and without fusion in video mode feature of claims of the '291 Patent. Therefore, the disclosure of Golan is presented in a new light that escaped review during earlier examination under MPEP § 2216.

Third, the combination of Golan in view of Parulski here is substantially different from combinations in IPR2018-01348. There, Golan was presented as a tertiary reference with teachings applied to the combination of Parulski and Christie. In contrast, in this Request, Golan is presented as the primary reference, with teachings applied to the combination of Parulski without Christie.

Fourth, in IPR2018-01348, Golan was ***not*** considered by the Board at all, much less as a primary reference. Specifically, the Board denied the petition only based on its finding that "Petitioner has not shown a reasonable rationale for combining Parulski and Christie," and explicitly stated that it "[did] ***not*** consider such a ground" of "a combination of Parulski and Golan without Christie." Ex.X, IPR2018-01348, Decision Denying Institution, 16. Thus, this request presents new, noncumulative teachings of the prior art with the combination of Golan and Parulski. Indeed, as discussed above in III.A, the Board has already upheld the combination of Golan and Parulski in finding unptatentable similar claims of related '233 Patent and '942 Patent in IPR2020-00487 and IPR2020-00860, and "co-invented and co-owned" '332 Patent and '898 Patent in IPR2020-00861 and IPR2020-00862. *See* Ex.FF, '322 Patent, 8:36; Ex.GG, '898 Patent, 8:31.

Accordingly, the combination of Golan in view of Parulski raises a substantial new question of patentability.

2. Each of the Combinations of Golan in view of Parulski with Levey, Martin, Konno, and/or Baer Raises a Substantial New Question of Patentability.

Additionally, the Office has not considered each the combinations of Golan in view of Parulski, with Levey, Martin, Konno, and/or Baer as presented in this Request. **First**, Parulski, Levey, Martin, Konno, and Baer were each not considered during prosecution of the '291 Patent. **Second**, Levey, Martin, and Baer were not presented in IPR2018-01348. **Third**, while in IPR2018-01348, Konno was presented to combine with Parulski, Christie, and Golan for claims 6-8, it was ***not*** considered by the Board at all. Ex.X, IPR2018-01348, Decision Denying Institution, 16.

Accordingly, each of the combinations of Golan in view of Parulski with Levey, Martin, Konno, and/or Baer raises a substantial new question of patentability.

VII. DETAILED EXPLANATION OF THE PERTINENCE AND MANNER OF APPLYING THE PRIOR ART REFERENCES TO EVERY CLAIM FOR WHICH REEXAMINATION IS REQUESTED

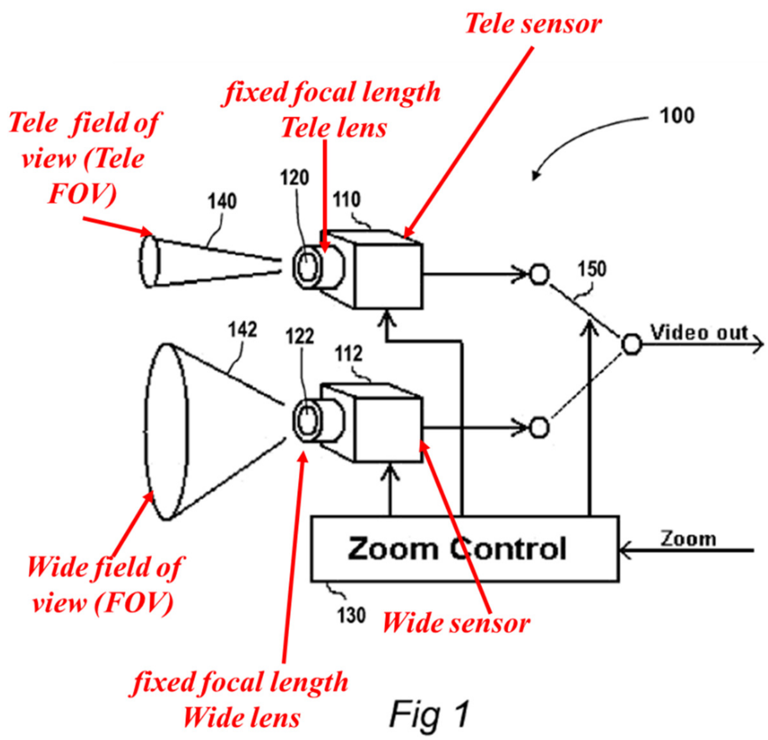
A summary of the prior art cited in the present request is provided below, followed by a listing of proposed rejections and a detailed explanation of the pertinency and manner of applying these references to every claim for which reexamination is requested.

A. Proposed Rejection 1: Claims 1, 2, 4-6, 10-14, and 17 are unpatentable under §103 over Golan in view of Parulski.

1. Summary of Golan

Like the '291 Patent, Golan discloses providing video output with "a continuous electronic zoom for an image acquisition system, the system including multiple imaging devices having different fixed FOV." Ex.F, Golan, FIG. 1, Title, [0002]; Ex.D, ¶33.

Golan teaches the use of wide and tele lenses and employs wide and tele images during digital zooming, which "facilitates a light weight electronic zoom with a large lossless zooming range." Ex.F, Golan, [0009]. Specifically, as illustrated in FIG. 1 below, Golan discloses zoom control sub-system 100 for an image acquisition system including "multiple image sensors" (e.g., tele image sensor 110 and wide image sensor 112), "each with a fixed and preferably different FOV" (e.g. with tele FOV 140 and wide FOV 142 respectively). Ex.F, Golan, [0036]-[0037]; Ex.D, ¶34.



Ex.F, Golan, FIG. 1, annotated

Golan teaches that, in embodiments of FIGS. 1 and 2, each image frame of video output is generated based on an acquired image frame from "the relevant image sensor" of an image acquisition device selected based on the user input zoom factor. Ex.F, Golan, FIGS. 1-2, [0039]. Accordingly, Golan's embodiments of FIGS. 1 and 2 teaches providing, in video mode, continuous zoom video output images without fusion, by providing each image frame from a selected image acquisition device. Specifically, Golan teaches that zoom control circuit 130 receives a required zoom amount from an operator of the image acquisition system, and activates image sensor selector 150 position to select the relevant image sensor (110 and 112) based on the required zoom amount. Ex.F, Golan, [0039]; Ex.D, ¶35.

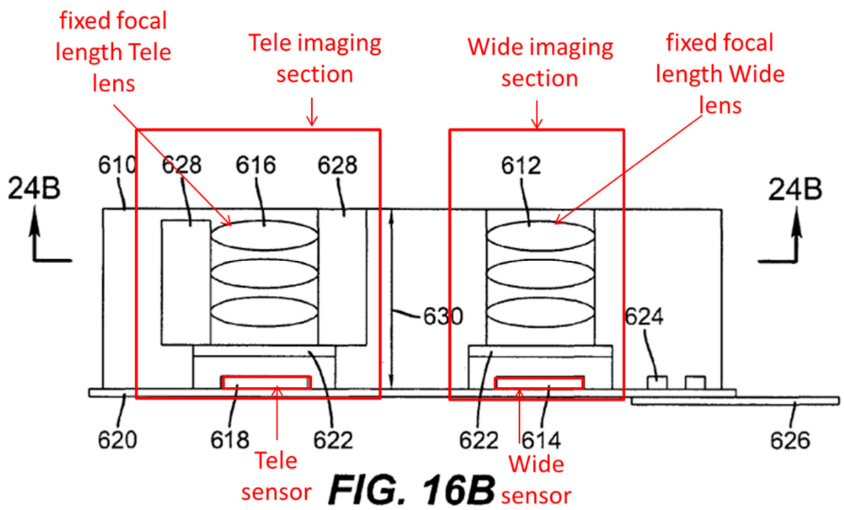
Golan teaches that "an electronically calibrating is performed to determine the alignment offsets between wide image sensor array 110 and tele image sensor array 112," (Ex.F, Golan, [0038]) and that the "**calibration** of the alignment, between the first image sensor array and the second image sensor array, **facilitates continuous electronic zoom with uninterrupted imaging**, when **switching** back and forth between the first image sensor array and the second image sensor array." Ex.F, Golan, [0015]. As such, Golan teaches achieving smooth transition with uninterrupted imaging when switching between two imaging sections using electronic calibration. Ex.D, ¶36.

Golan's Tele and Wide images captured by Tele sensor 110 and Wide sensor 112 include parallax information, including position shifts of the objects in Tele and Wide images due to the distance between the two image sensors. Ex.D, ¶37. These images may be referred to as parallax images. *Id.* A viewer may observe a discontinuity/jump when switching between the Tele and Wide images because of the position shift in the parallax images. *Id.* Golan describes using electronic calibration to achieve smooth transition with uninterrupted imaging when switching between Tele and Wide images in video by addressing such a parallax shift. It was well-known in the art that electronic calibration is a technique (e.g., using calibration test targets) to determine the correspondences between the coordinate systems represent the registration between in parallax images. Ex.N, Border, [0041]-[0042] (describing calibration at the time of manufacture, explaining that the "correspondences between the coordinate systems represent the registration between the wide image 204 and the telephoto image 206. The correspondences are preferably determined at the time of manufacture by shooting test targets, as is well known in the art."); Ex.D, ¶37. A POSITA would have understood that in Golan, the correspondences between the coordinated systems of the Wide and Tele imaging systems determined using electronic calibration are used for position matching the Wide and Tele images to cancel the parallax shift, thereby achieving smooth transition with uninterrupted imaging. *Id.*

2. Summary of Parulski

Like the '291 Patent, Parulski is directed at "Method and Apparatus for Operating a Dual Lens Camera to Augment an Image," and discloses "a digital camera that uses multiple lenses and image sensors to provide an **improved imaging capability**." Ex.G, Parulski, Title, 1:8-10; Ex.D, ¶38. Parulski's embodiments "include an image capture assembly, such as a digital camera … having multiple image capture stages, each composed of a lens and an image sensor, wherein

the lenses of the multiple image capture stages have different focal lengths to provide an extended optical zoom range for the image capture assembly." Ex.G, Parulski, 10:11-17. As shown in FIG. 16B below, Parulski teaches a digital camera including a Wide imaging section (including wide lens 612 and wide sensor 614), and a Tele imaging section including (tele lens 616 and tele sensor 618). Ex.G, Parulski, 23:4-43 (describing Figure 16 as "a cellular image capture assembly").



Ex.G, Parulski, FIG. 16B, annotated

Parulski describes that the "two (or more) image capture stages can be used to separately capture images of the same scene so that one image capture stage [secondary capture unit] can be used for autofocus and other purposes while the other(s) is used for capturing an image." *Id.,* 8:9-13. Parulski provides "several embodiments by which one image capture stage may be used to capture digital still images or video images while another image capture stage is simultaneously being used for another purpose, such as enhanced autofocus, generation of a secondary image, production of a range map, and the like." *Id.,* 10:26-31; Ex.D, ¶39.

First, Parulski describes fusion in still mode, in the context of zooming (*see e.g.*, FIG. 14, block 502). Ex.D, ¶40. For example, as shown in FIG. 14 below, Parulski describes capturing both a primary still image and a secondary still image. If the desired zoom is less than or equal to X, the first image capture stage 1 is the primary image capture stage that captures the still image, and if the zoom is greater than X, the second image capture stage 2 is the primary. Ex.G, Parulski, 22:17-26, The two image capture stages are set to different focus positions. Ex.G, Parulski, FIG. 14 (blocks 510, 512, 530, 532 setting two image capture stages to primary and

secondary focus positions), 18:47-52. Figure 14 of Parulski teaches using the two images at different focus positions to enhance the depth of field of the image.

Parulski describes that, in particular, the two images with different focus positions in the example of Figure 14 "are combined into a modified image with a **broadened depth of field**" where "the secondary **still image** is used to **sharpen portions of the primary still image that are positioned near the secondary focus distance**." Ex.G, Parulski, FIG. 26, 28:52-56; 7:32-35; *see also, e.g.*, Ex.II, Jacobs, FIG. 12, 7 (providing "all-focus" images having "an extended depth of field" by combining focused areas in images with different focus distances). As such, Parulski teaches in still mode, combining Wide and Tele image data (e.g., only in focused areas/sharp portions of Wide and Tele images positioned near their corresponding focus distances) to generate a fused output image (e.g., with a broadened depth of field); Ex.D, ¶41.

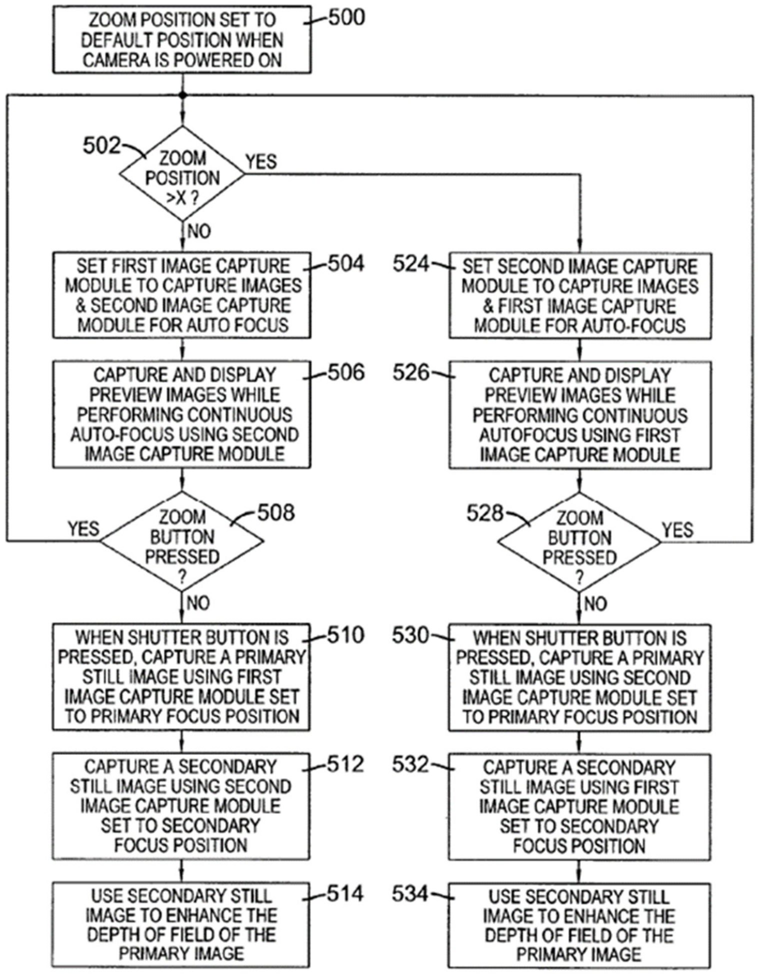


FIG. 14

Ex.G, Parulski, FIG. 14

Parulski explains that its methods (for modifying one image based on the other) may be used for either still or video images. Ex.G, Parulski, 29:8-19. A POSITA would have understood that the design choices of implementing Parulski's teachings of enhancement using a secondary capture unit ***with fusion*** include (1) in both video and still modes, (2) only in video mode, (3) only in still mode, or (4) not in either video or still mode. Ex.D, ¶42.

Second, Parulski teaches embodiments that do not fuse the images. Ex.D, ¶44. Parulski teaches that by using the non-primary capture imaging section to provide scene analysis data including secondary information (e.g., autofocus, aperture value, exposure time, white balance, ISO setting, etc.) for the capturing imaging section. Ex.G, Parulski, FIG. 8 (e.g., blocks 104, 124);

26:18-20 ("set[ting] the primary capture unit parameters utilizing the scene analysis data obtained by the scene analysis capture unit"); *see also* Ex.G, Parulski, FIGS. 20-22 and 24-26; 25:62-26:1 ("Such scene analysis data could include without limitation exposure data,... color balance,… etc., and the capture unit parameters could include without limitation aperture value, exposure time, focus position, white balance, ISO setting, etc.").

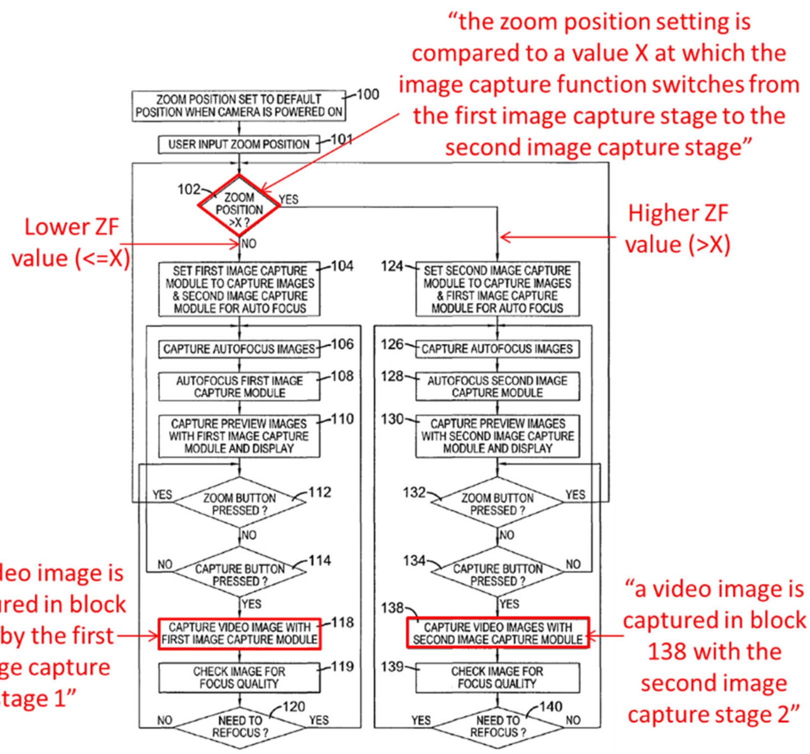


FIG. 8

Ex.G, Parulski, FIG. 8, annotated

Parulski does not limit its teachings of using a secondary imaging unit to enhance the primary imaging unit ***without fusion*** (e.g., autofocus, scene analysis data as secondary information) to a particular imaging mode (e.g., still or video). Ex.D, ¶44. Parulski explains that its methods (for modifying one image based on the other) may be used for either still or video images. Ex.G, Parulski, 29:8-19. A POSITA would have understood that the design choices of implementing Parulski's teachings of enhancement using a secondary capture unit ***without fusion*** include implementing without fusion (1) in both video and still modes, (2) only in video mode, (3) only in still mode, or (4) not in either video or still mode. Ex.D, ¶44. Accordingly, regarding implementing fusion and without fusion in video and/or still modes, a POSITA would

have understood that Parulski's teachings would be implemented with the following four design choices. Ex.D, ¶45.

	Still Mode	**Video Mode**
Design Choice 1	Fusion	Fusion
Design Choice 2	Fusion	Without Fusion
Design Choice 3	Without Fusion	Fusion
Design Choice 4	Without Fusion	Without Fusion

Parulski itself recognizes that still and video may have different challenges, requiring different solutions. Ex.D, ¶46. For example, Figure 3 describes a method for selecting which image capture stage will capture the images based on the zoom position, and using the non-capture stage for autofocus. Ex.G, Parulski, Fig. 3 blocks 102, 104, 124, and 15:43-16:23. While the method in Figure 3 could also be used with video, Parulski recognizes that video images have special challenges. Ex.G, Parulski, 11:26-58 ("a special problem arises during video capture … ."). Accordingly, Parulski describes using a method specifically advantageous for video in FIG. 8. As shown in annotated FIG. 8 below, if the desired zoom in video mode is less than or equal to X, the first image capture stage 1 is the primary image capture stage that captures the video image and the secondary image capture stage is used for autofocus. Ex.G, Parulski, FIG. 8 (block 104). If the zoom is greater than X, the second image capture stage 2 is the primary and the first image capture stage is used for autofocus. Ex.G, Parulski, FIG. 8 (block 124), 18:25-59. Parulski teaches possible autofocus processes for the configuration in Figure 8. Ex.G, Parulski, FIG.9-10, 18:60-19:48; Ex.D, ¶47.

Parulski's teachings of the Figure 8 embodiment with a different method for video provide the benefit of addressing special problems arising during video capture (e.g., autofocus challenges for video frame sequences). Ex.D, ¶48. This is consistent with the well-known knowledge in the art for applying different configurations for different operation modes in a digital imaging system. *See e.g.,* Ex.JJ, Guo, 1:36-46 (recognizing that an ideal device that "would have multiple cameras and could send out live video that is a composition of video from at least two cameras" "is an especially difficult problem in light of the limited resources available for portable devices, both in terms of the device processing multiple captured video streams and a network to which the device is connected handling the transmission of the live

video streams."); Ex.Y, Ninan, 5:33-41 (providing image sensors and controllers may be "**configured to support image acquisition operations of various operational modes** [including] still image mode…video mode…etc."); Ex.D, ¶48.

3. Reasons to Combine Golan and Parulski

As Dr. Durand has previously opined in four IPR proceedings that ultimately found claims of related/co-invented and co-owned patents unpatentable, at the time of the '291 Patent, it would have been obvious to a POSITA to combine Golan's imaging system with Parulski's teachings to achieve improved imaging capability in still mode and video mode in the system of Golan. Dr. Durand's opinions regarding the obviousness of combining Golan and Parulski have been confirmed by the Board in all four proceedings related to U.S. Patent No. 9,661,233 (IPR2020-00487), U.S. Patent No. 10,326,942 (IPR2020-00860), U.S. Patent No. 10,230,898 (IPR200-00861), and U.S. Patent No. 10,356,332 (IPR2020-00862). Ex.D, ¶¶49-56.

Regarding the claimed feature of fusion in still mode and without fusion in video mode (e.g., as recited in claims 1 and 17 of the '291 Patent), in IPR2020-00861 and IPR2020-00862, the Board confirmed the combination of Golan and Parulski for invalidating claims reciting similar features. For example, in IPR2020-00862, the Board agreed that "a person of ordinary skill 'would have been motivated to apply Parulski's teachings of still mode fusion to a still mode of Golan, while in video mode, maintaining Golan's design choice of video switching (e.g., for the benefit of reduced computation power of video switching over video fusion)." Ex.S, IPR2020-00862 FWD, 69-72 (the Board relying on the combination of Golan's teachings of continuous zoom video without fusion and Parulski's teachings of fusion in still mode to find unpatentable claim 22 of the '332 Patent); *see also* Ex.T, IPR2020-00861 FWD, 69-71 (similarly relying on the combination of Golan and Parulski to find unpatentable claim 20 of the '898 Patent).

Regarding the claimed feature of using secondary information from a secondary imaging section in video mode (e.g., as recited in claim 11 of the '291 Patent), in IPR2020-00487 and IPR2020-00860, the Board has confirmed the combination of Golan and Parulski for finding similar claims unpatentable. For example, in IPR2020-00487, the Board confirmed the combination of Golan and Parulski "because they share a need to provide improved quality digital zoom video output images, which switches between images from two imaging sections

having different points of view and fields of view at a switch zoom point," and because the combination "would have produced operable results that are predictable." (Ex.Q), IPR2020-00487 FWD, 56-57 (relying on the combination of Golan's teachings of continuous zoom video without fusion and Parulski's teachings of using secondary information from non-primary capture unit in video mode to find unpatentable claims 9 and 18 of the '233 Patent); Ex.R, IPR2020-00860 FWD, 63-66 (similarly relying on the combination of Golan and Parulski to find unpatentable claims 6, 7, 24, and 25 of the '942 Patent). The analysis below is consistent with the analysis presented to and confirmed by the Board in those IPR proceedings.

First, Golan and Parulski are analogous prior art to the '291 Patent. Ex.D, ¶52. They are in the same field of endeavor (digital camera system). Further, they are each reasonably pertinent to the problem faced by the inventor of the '291 Patent of providing improved imaging capabilities with a large zoom range using a multi-lens digital system. Ex.F, Golan, [0036]-[0037] ("Zoom control sub-system 100 includes a tele image sensor 110 coupled with a narrow lens 120 having a predesigned FOV 140, a wide image sensor 112 coupled with a wide lens 122 having a predesigned FOV 142, a zoom control module 130 and an image sensor selector 150"); Ex.G, Parulski, 1:8-10, 5:21-23, 23:54-55 (describing "a digital camera that uses multiple lenses and image sensors to provide an improved imaging capability" and "a large 'optical zoom range'" using digital zoom).

Second, a POSITA would have been motivated to incorporate the teachings of Parulski with Golan's system because they share the same need to provide improved imaging capabilities with a large zoom range using a multi-lens digital system. Ex.D, ¶53; Ex.G, Parulski, 1:8-10, 5:21-23, 23:54-55. "[A]ny need or problem known in the field of endeavor at the time of the invention and addressed by the patent can provide a reason for combining the elements in the manner claimed." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 420 (2007). Here, to provide improved capabilities in still mode (e.g., providing a fused output still image with a broadened depth of field) and in video mode (e.g., providing improved zoom video output images which switches between images from two imaging sections having different points of view) are needs shared by Parulski and Golan.

Third, when applying Parulski's teachings of providing a fused output image in still mode to the digital imaging system of Golan with video mode without fusion, a POSITA would have maintained Golan's design choice of video switching without fusion. Ex.D, ¶54. A

POSITA would have understood that Golan teaches separate embodiments for (1) video mode using switching without fusion and (2) video mode with fusion respectively. *See, e.g.*, Ex.F, Golan, FIG. 1, [0015], [0040] (describing video switching without fusion); FIGS. 6 and 7, [0064]-[0068] (describing video fusion with video fusion modules 660 and 760). As such, a POSITA would understand that in Golan itself, using fusion or not using fusion is a design choice. Thus, a POSITA starting with the digital imaging system of Golan with video mode without fusion in FIG. 1, when designing a still mode for the digital imaging system, would have been motivated to apply Parulski's teachings of providing a fused output image in still mode only to the still mode. *See also* Ex.KK, Kodak EasyShare V610 (well-known that it was desirable to provide both still and video modes in a digital camera). In the combination, the POSITA would have maintained Golan's design choice of video switching without fusion over video fusion described in Golan's separate embodiments, for the benefit of reduced computation power of video switching over video fusion. Such combination is consistent with Parulski's teachings of fusion in still mode and without fusion in video as a design choice, and well-known knowledge in the art for applying different configurations for still and video modes, which has the benefit of addressing "special problem[s] arising during video capture." *See, e.g.*, Ex.G, Parulski, 6:59-7:3; Ex.JJ, Guo, 1:36-46; Ex.Y, Ninan, 5:33-41..

Fourth, combining Parulski's teachings with the system of Golan would have produced operable results that are predictable, with a reasonable expectation of success. Ex.D, ¶55. Specifically, combining Parulski's teachings in the digital camera of Golan would have been no more than the combination of known elements according to known methods, and would have been obvious to a POSITA at the time of the '291 Patent to achieve the benefits of improved still and video image quality as described by Parulski. Therefore, there would have been a reasonable expectation of success. The known elements according to known methods include in still mode, when requested zoom factor is at the zoom range, configuring Wide and Tele imaging sections to capture Wide and Tele simultaneously and generating a composite image by combining focused areas of Wide and Tele images in the camera controller of Golan. The known elements according to known methods also include in video mode, performing scene data analysis of images from a secondary imaging section to provide secondary information for adjusting capture parameters of the primary imaging section for providing the video output image when switching between Wide and Tele images in zoom control sub-system of Golan.

The combination of Parulski's teachings with the digital camera of Golan does not require physical incorporation of Parulski image processor and/or imaging sections into the digital camera of Golan.

To the extent that any modification would have been needed to the system of Golan in order to accommodate the teachings of Parulski, such modifications would have been within the level of ordinary skill in the art. Ex.D, ¶56.

4. Claim 1 would have been obvious over Golan and Parulski.

[1.0] A zoom digital camera comprising:

To the extent that this preamble is deemed limiting, Golan teaches a dual-aperture zoom digital camera. Ex.D, ¶¶57-61.

Specifically, Golan is titled "**Continuous Electronic Zoom for an Imaging System with Multiple Imaging Devices** Having Different Fixed FOV," and teaches a zoom digital imaging system with multiple imaging devices each defining an aperture for capturing a digital image. Ex.F, Golan, Title. Golan explains that "**digital zoom** is a method of narrowing the apparent angle of view of **a digital still or video image**," and that "[u]sing two (or more) image sensors, having different fixed FOV, facilitates a light weight electronic zoom with a large lossless zooming range." Ex.F, Golan, [0003], [0009]. Ex.D, ¶58.

As shown in Fig. 1 of Golan below, Golan's image acquisition system includes a zoom control sub-system 100, which includes "**a tele image sensor 110 coupled with a narrow lens 120** having a predesigned FOV 140, a **wide image sensor 112 coupled with a wide lens 122** having a predesigned FOV 142, **a zoom control module 130** and an image sensor selector 150." Ex.F, Golan, [0037]. Golan's zoom control circuit 130 "receives a required zoom from an operator of the image acquisition system and selects the relevant image sensor (110 and 112) by activating image sensor selector 150 position. The relevant camera zoom factor is calculated by zoom control unit 130." Ex.F, Golan, [0039]. Ex.D, ¶59.

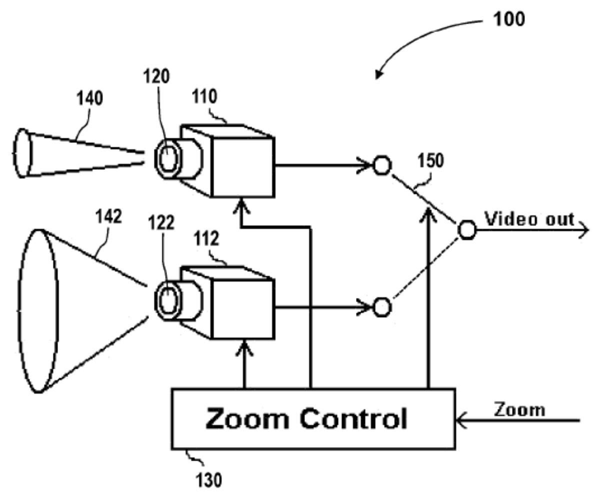


Fig 1

Ex.F, Golan, FIG. 1

In Golan's zoom control sub-system 100, each of the Wide imaging device (including wide image sensor 112 and wide lens 122) and the Tele imaging device (including tele image sensor 110 and narrow lens 120) defines an aperture for generating a corresponding digital image. *See* Ex.F, Golan, FIG.1. As such, Golan's image acquisition system including a zoom control sub-system 100 is a multiple aperture digital camera providing digital zoom. Ex.D, ¶60. It is noted that the '291 Patent states "dual aperture" is "also referred to as dual-lens or two-sensor," and describes that a "multi-aperture imaging system (implemented for example in a digital camera) includes a plurality of optical sub-systems (also referred to as "sub-cameras")." Ex.A, 3:22-23, 1:50-53.

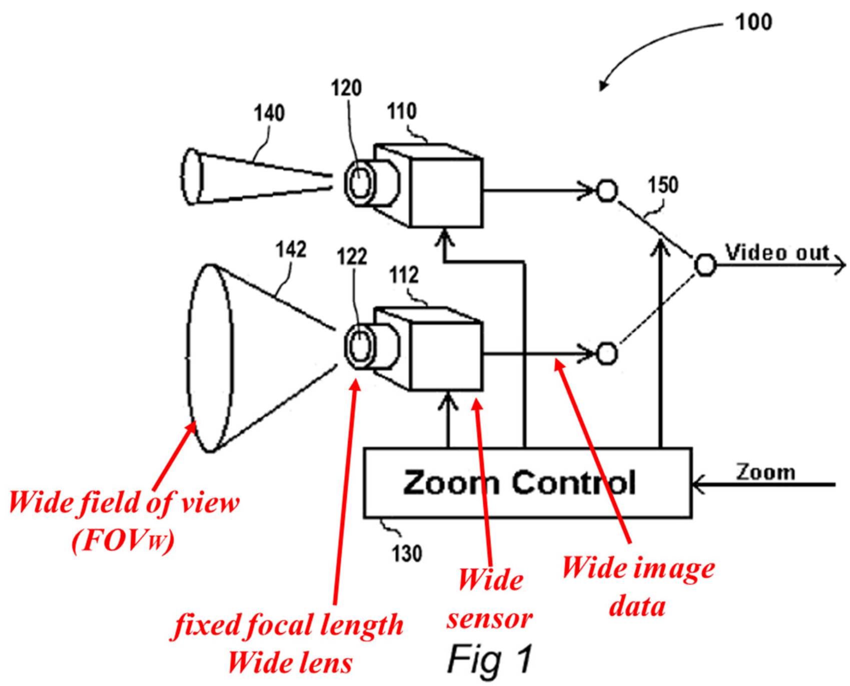
Therefore, Golan's image acquisition system including zoom control sub-system 100 teaches [1.0]. Ex.D, ¶61.

[1.1] a) a Wide imaging section that includes a fixed focal length Wide lens with a Wide field of view (FOV), a Wide sensor and a Wide image signal processor (ISP), the Wide imaging section operative to provide Wide image data of an object or scene;

The combination of Golan and Parulski renders obvious this limitation. Ex.D, ¶¶62-75.

First, Golan's zoom control sub-system 100 includes a Wide imaging section that includes a wide lens 122 with a fixed FOV 142 and a wide image sensor 112, which is operative

to provide Wide image data of object 20. Ex.D, ¶63. As shown in annotated Fig. 1 of Golan below, Golan's zoom control sub-system 100 includes a Wide imaging section that includes a wide lens 122 (fixed focal length Wide lens) with a FOV 142 (Wide field of view FOV_W) and a wide image sensor 112 (Wide sensor). Ex.F, Golan, FIG. 1, [0036]-[0037].



Ex.F, Golan, FIG. 1, annotated

Golan's wide lens 122 has a "fixed" and "predesigned FOV 142," therefore, teaches a fixed focal length Wide lens. Ex.F, Golan, [0036]-[0037]; *see also* Ex.F, Golan, [0009], [0043]; Ex.CC, Jacobson, FIG. 4.13, 48; Ex.A, 7:3-5; Ex.D, ¶64.

The Wide imaging section of Golan is operative to provide Wide image data of object 20 (an object or scene), which is "viewed from both tele image sensor 110 and wide image sensor 112." Ex.F, Golan, [0037]. Ex.D, ¶65.

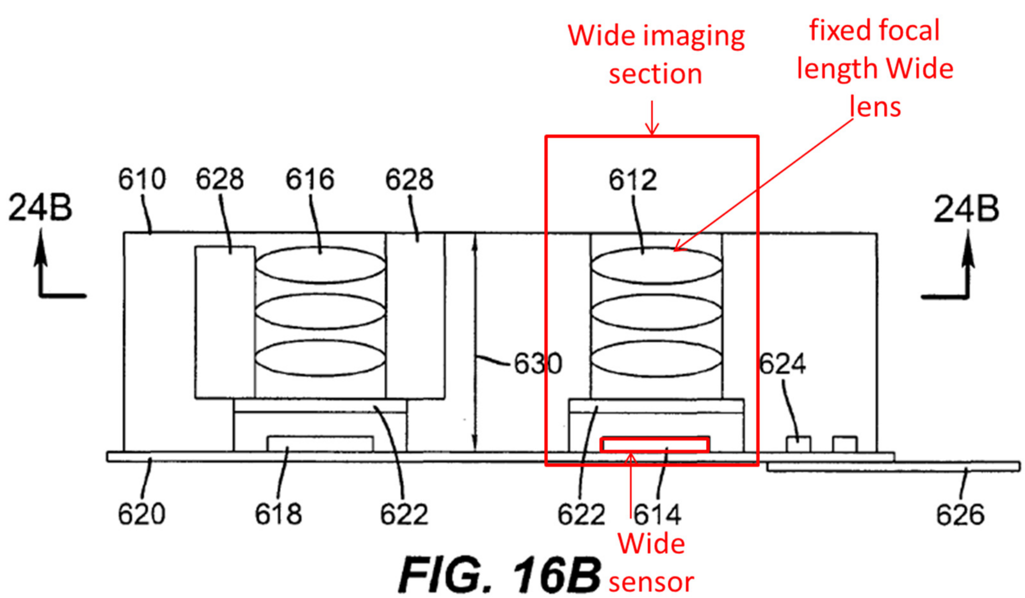
Specifically, Golan teaches an "**image frame is acquired by the selected image acquisition device**," and as such, teaches that Wide imaging section outputs a Wide image acquired by a wide image sensor 112. Ex.F, Golan, [0039], [0041], [0048]. A POSITA would have understood that when the wide image sensor 112 is selected, the Wide imaging section of

Golan (including wide lens 122 and wide image sensor 112) provides Wide image data of object 20 as the acquired image frame. Ex.D, ¶66.

Therefore, Golan's zoom control sub-system 100 includes a Wide imaging section that includes a wide lens 122 with a fixed FOV 142 and a wide image sensor 112, which is operative to provide Wide image data of object 20. Ex.D, ¶67.

Second, it would have been obvious to a POSITA that Golan's Wide imaging section includes a Wide ISP for providing the Wide image data. To the extent that Patent Owner argues that Golan does not explicitly describe a Wide ISP, Parulski explicitly describes a Wide ISP. Like Golan, Parulski teaches a fixed focal length Wide lens with a Wide FOV, and explicitly teaches a Wide ISP in a Wide imaging section. Ex.D, ¶¶68-71.

Specifically, Parulski teaches a fixed focal length Wide lens with a Wide field of view (FOV). Relative to FIG. 16B below, Parulski teaches that camera phone 600 includes "first lens 612, preferably **a fixed focal length wide angle lens**." Ex.G, Parulski, 23:33-38. A POSITA would have understood that Parulski teaches that lens 612 has a Wide FOV determined based on its equivalent focal length (e.g., 28 and 44 degrees corresponding to "40 mm equiv." and "22 mm equiv." respectively). Ex.G, Parulski, 23:36-40, 21:57-61; Ex.D, ¶¶68-69.



Ex.G, Parulski, FIG. 16B, annotated

Note that a POSITA would have recognized that FOV in the '291 Patent is defined as "measured from the center axis to the corner of the sensor (i.e. **half the angle of the normal**

definition)," (Ex.A, 6:56-58), which corresponds to the semi-angle of view θ of FIG. 4.13 of Jacobson calculated as:

$$\mathrm{FOV} = \theta = \tan^{-1}\left(\frac{K}{2f}\right), \quad (1)$$

where K is a sensor diagonal size and f is a focal length of the lens. Ex.CC, Jacobson, 48; Ex.D, ¶70.

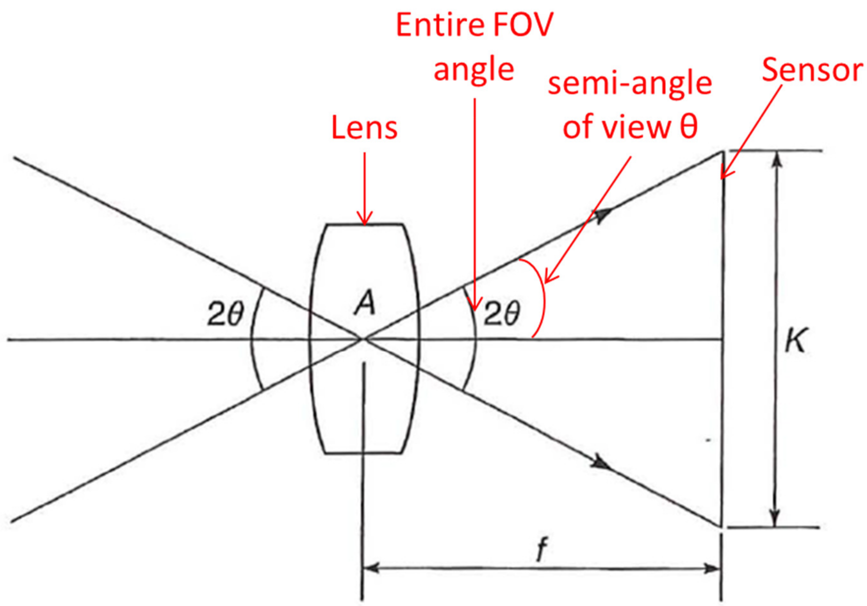


Figure 4.13 Field (angle) of view (FOV) of a lens related to format dimension

Ex.CC, Jacobson, FIG. 4.13, annotated

Furthermore, Parulski explicitly describes a Wide ISP in its Wide imaging section. Ex.D, ¶¶71-72. Parulski explains that in embodiments of FIGS. 16A and 16B, "similarly as was explained in connection with FIG. 1, an analog output signal from the first image sensor 614 is amplified by **a first analog signal processor**." Ex.G, Parulski, 24:36-42. Relative to FIG. 1 below, Parulski teaches that digital camera 10A "is included **as part of a camera phone**," for example, camera phone 600, where "one (or **both**) of the zoom lenses 3 and 4 could be **replaced with a fixed focal length lens**." Ex.G, Parulski, 13:4-6, 15:31-32; *see also* Ex.G, Parulski, 23:4-7. Parulski explains that "analog output signal 12e from **the first image sensor 12 is amplified and converted to a first digital image signal by a first analog signal processor 22**." Ex.G, Parulski, 13:48-53. Further, Parulski teaches capturing images "using the **shorter focal length first image capture stage** and the longer focal length second image capture stage." Ex.G, Parulski, 17:62-66. Therefore, Parulski

teaches its first image capture stage (e.g., first imaging stage 1 of FIG. 1) includes the Wide lens, and as such, first image sensor 12 and first analog signal processor 22 of first imaging stage 1 correspond to first image sensor 614 and first analog signal processor of camera phone 600 respectively.

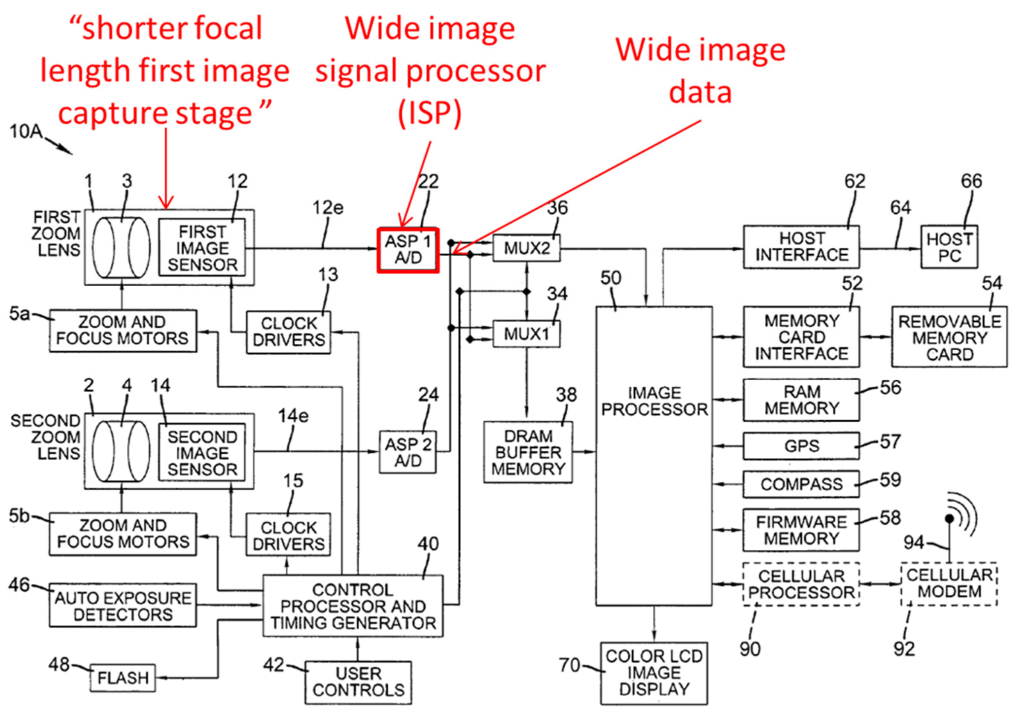


FIG. 1

Ex.G, Parulski, FIG. 1, annotated

As shown in FIG. 1, Parulski also describes that image processor 50 receives data from first image sensor 12, and performs "various other image processing functions." Ex.G, Parulski, 14:57-63. Thus, in Parulski, a wide image pipeline includes analog and digital processing components (e.g., first analog signal processor 22 and image processor 50). At least Parulski's first analog signal processor 22 performs signal processing on the wide image signal from first image sensor 614, and corresponds to Wide ISP as claimed. *Id.*; Ex.BB, KAC-1310, 7. To the extent Patent Owner argues that digital processing of image processor 50 is necessary to its Wide ISP, allocation of signal processing to particular components is a matter of design choice and that it was well known in the art of dual image sensor cameras to maintain separateness of Wide and Tele image pipelines through digital signal processing. Ex.AA, Lee, FIG. 2, [0031], [0036]-[0038]; Ex.D, ¶73.

Parulski teaches that a Wide imaging section is operative to provide Wide image data of an object or scene, where the Wide imaging section includes lens 612, image sensor 614, first analog signal processor 22, and image processor 50. Specifically, "**first lens 612** ... **forms an image on the first image sensor 614**," and an analog output signal from image sensor 614 is "amplified and converted to **a first digital image signal** by a first analog signal processor 22." Ex.G, Parulski, 13:48-53, 23:28-43. Image processor 50 may further perform "image processing functions" to that first digital image signal. Ex.G, Parulski, 14:57-63. As such, the first digital image signal provided by the Wide imaging section corresponds to the Wide image data as claimed. Ex.D, ¶74.

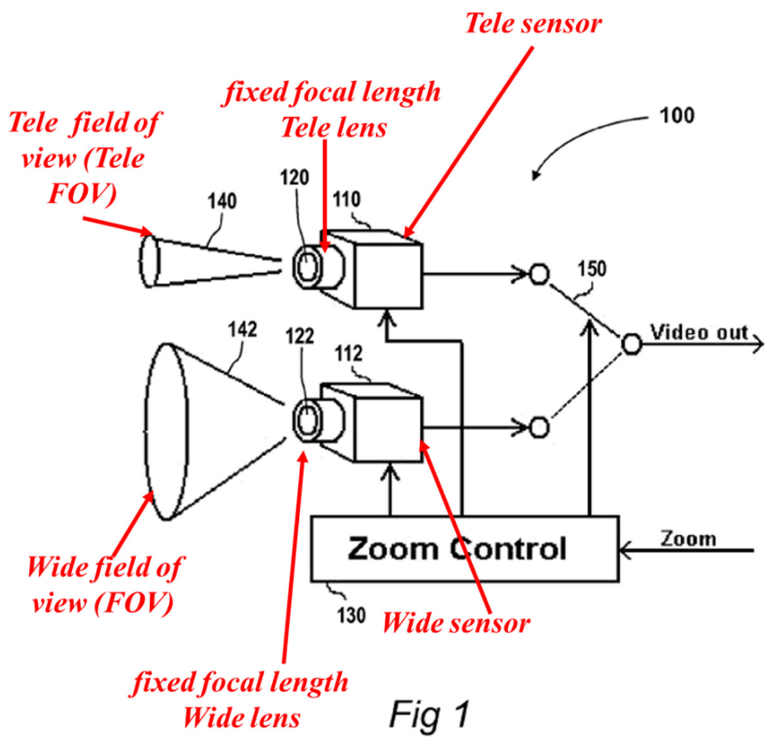
Therefore, in the combination of Golan and Parulski, a POSITA would have understood that in the system of Golan combined with Parulski, a zoom control sub-system 100 includes a Wide imaging section that includes a wide lens 122 with a fixed FOV 142, a wide image sensor 112, and a Wide ISP (e.g., a first analog signal processor), which is operative to provide Wide image data of object 20, which teaches "*a Wide imaging section that includes a fixed focal length Wide lens with a Wide field of view (FOV), a Wide sensor and a Wide image signal processor (ISP), the Wide imaging section operative to provide Wide image data of an object or scene*" as recited. Ex.D, ¶75.

[1.2] b) a Tele imaging section that includes a fixed focal length Tele lens with a Tele FOV that is narrower than the Wide FOV, a Tele sensor and a Tele ISP, the Tele imaging section operative to provide Tele image data of the object or scene; and

The combination of Golan and Parulski renders obvious this limitation. Ex.D, ¶¶76-89.

First, Golan teaches a Tele imaging section that includes a Tele sensor and a fixed focal length Tele lens with a Tele FOV that is narrower than the Wide FOV, and a Tele sensor, the Tele imaging section operative to output a Tele image. Ex.D, ¶77.

As shown in annotated Fig. 1 of Golan below, Golan's zoom control sub-system 100 includes a Tele imaging section that includes a tele image sensor 110 (Tele sensor) coupled with a narrow lens 120 (a fixed focal length Tele lens) having a predesigned FOV 140 (Tele FOV). Ex.F, Golan, FIG. 1, [0036]-[0037]; *see also* Ex.F, Golan, Abstract ("a computerized image acquisition system [] having … a tele image acquisition device having a tele image sensor array coupled with a tele lens having a narrow FOV."); Ex.D, ¶78.



Ex.F, Golan, FIG. 1, annotated

For the same reason discussed in [1.1], because Golan's tele lens 120 has "a **predesigned** FOV 140," it teaches a fixed focal length Tele lens. Ex.F, Golan, [0037]; *see also* Ex.F, Golan, [0009], [0036], [0043]. As such, Golan teaches a Tele imaging section including a fixed focal length tele lens. Ex.D, ¶79.

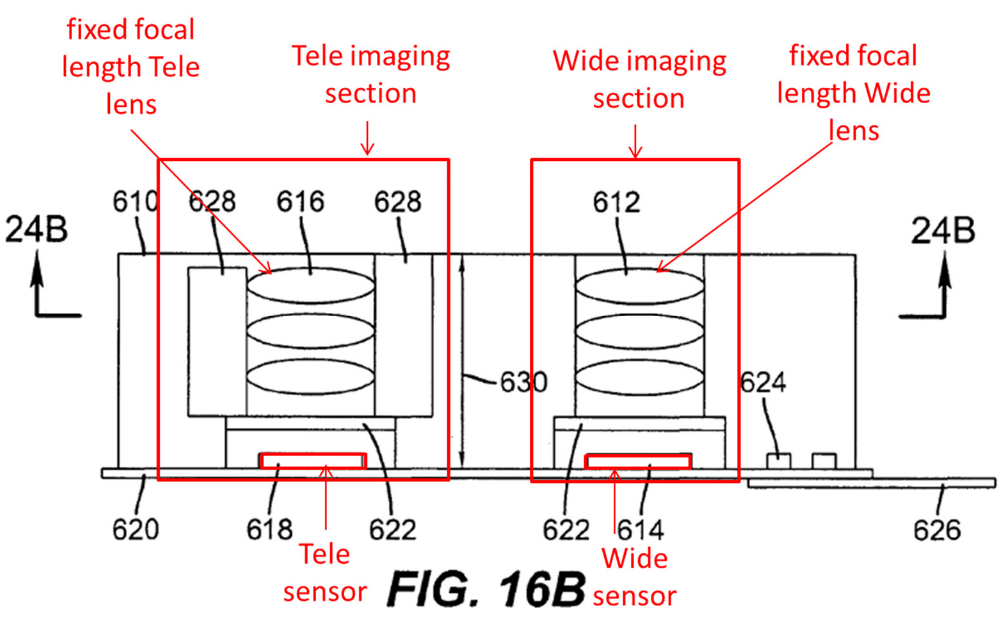
Golan teaches a FOV 140 (Tele FOV) of the narrow lens 120 that is narrower than FOV 142 (Wide FOV) of the wide lens 122. Ex.D, ¶80. Specifically, Golan provides that "[p]referably, wide FOV 142 is **substantially wider than** narrow FOV 140." Ex.F, Golan, [0043]. In other words, Golan teaches that narrow FOV 140 is narrower than wide FOV 142. *See also* Golan, FIG. 1, [0009], [0037] (providing that "[i]n the optimal configuration, the FOV of wide image sensor 112 can be calculated by multiplying the FOV of tele image sensor 110 by the optimal zoom of image sensors 110 and 112," where the optimal zoom is greater than one).

The Tele imaging section of Golan outputs a Tele image. Ex.D, ¶¶81-82. Specifically, Golan teaches that the Tele imaging section of zoom control sub-system 100 includes a "**tele image acquisition device**." Ex.F, Golan, [0037]; *see also* Ex.F, Golan, Abstract ("a computerized image acquisition system [] having … **a tele image acquisition device** having a

tele image sensor array coupled with a tele lens having a narrow FOV."). Further, zoom control circuit 130 "receives a required zoom from an operator of the image acquisition system, and selects the relevant image sensor (110 and 112) by activating image sensor selector 150 position," and an "image frame is acquired by the selected image acquisition device." Ex.F, Golan, [0039], [0041], [0048]. A POSITA would have understood that when the tele image sensor 110 is selected, the Tele imaging section of Golan (including tele lens 120 and tele image sensor 110) outputs a Tele image as the acquired image frame. Therefore, Golan's zoom control sub-system 100 includes a Tele imaging section that includes a tele image sensor 110 and a tele lens 120 with fixed Tele FOV 140 narrower than fixed wide FOV 142.

Second, it would have been obvious to a POSITA that Golan's Tele imaging section includes a Tele ISP for providing the Tele image data. To the extent that Patent Owner argues that Golan does not explicitly describe a Tele ISP, Parulski explicitly describes a Tele ISP. Like Golan, Parulski teaches a fixed focal length Tele lens with a Tele FOV that is narrower than the Wide FOV, and explicitly teaches a Tele ISP in a Tele imaging section. Ex.D, ¶83.

Relative to FIG. 16B below, Parulski teaches that camera phone 600 includes "second lens 616, preferably **a fixed focal length telephoto lens**." Ex.G, Parulski, 23:38-40; Ex.D, ¶84.

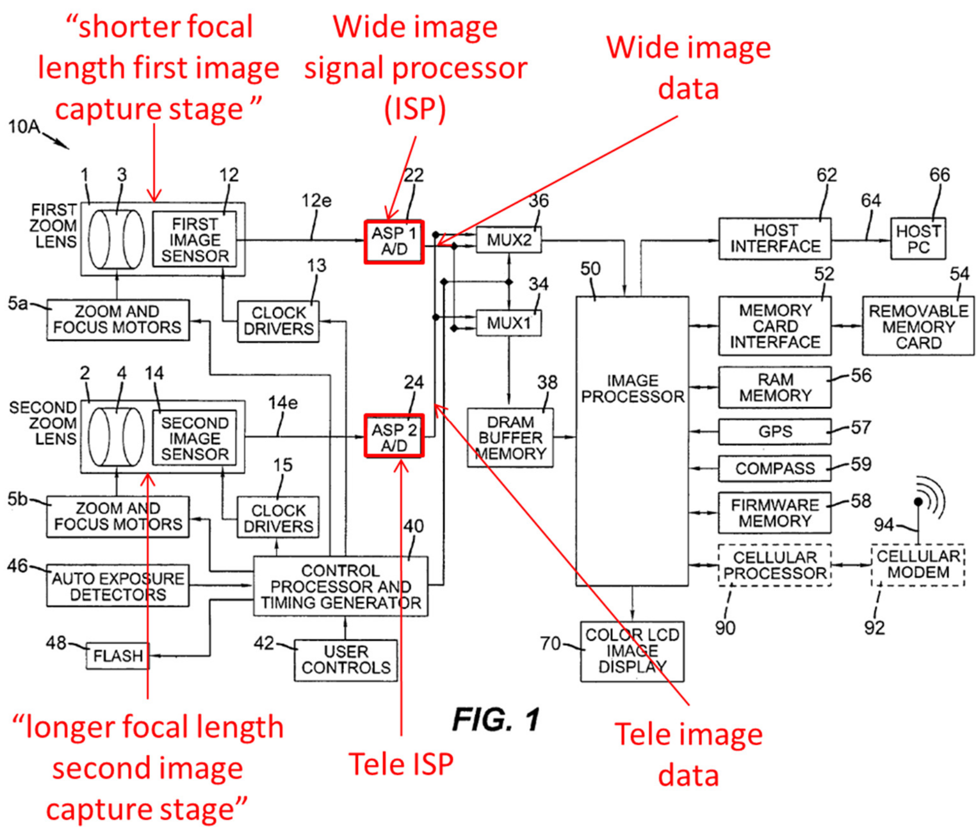


Ex.G, Parulski, FIG. 16B, annotated

Parulski teaches that Tele lens 616 has a Tele FOV narrower than the Wide FOV of Wide lens 612. Parulski describes that Tele lens 616 may be "a fixed focal length telephoto lens (such as

100 mm equiv. lens)." Ex.G, Parulski, 23:38-40. A POSITA would have understood that telephoto lens 616 has a Tele FOV determined based on its equivalent focal length (e.g., 12 degrees corresponding to "100 mm equiv."), which is narrower than the Wide FOV (e.g., 28 degrees and 44 degrees corresponding to "40 mm equiv." and "22 mm equiv." respectively) of Wide lens 612. Parulski teaches a Tele sensor 618, where "**second lens 616** ... **forms an image on the second image sensor 618**." Ex.G, Parulski, 23:44-47. Parulski explains that "the wide angle image sensor 614 may have high resolution, e.g., higher than that of the **telephoto image sensor 618**, in order to provide a higher quality source image for the digital zooming." Ex.G, Parulski, 23:58-61. **Fourth**, Parulski teaches that a Tele imaging section is operative to provide Tele image data of the object or scene of the Wide image data, where the Tele imaging section includes lens 616, image sensor 618, second analog signal processor 24 and image processor 50. Specifically, "**lens 616** ... **forms an image on the second image sensor 618**," and Wide lens 612 and Tele lens 616 "are oriented in in the same direction in order to **form images of the same portion of the overall scene** in front of them, albeit with different fields of view." Ex.G, Parulski, 23:28-43. Parulski also teaches that an analog output signal from Tele sensor 618 is "is amplified and converted to **a second digital image signal by a second analog signal processor 24**." Ex.G, Parulski, 13:53-56. Image processor 50 may further perform "image processing functions" to that second digital image signal. Ex.G, 14:57-63. Parulski teaches capturing images "using the shorter focal length first image capture stage and the **longer focal length second image capture stage**." Ex.G, Parulski, 17:62-66. Therefore, Parulski teaches its second image capture stage (e.g., second imaging stage 2 of FIG. 1) includes the Tele lens, and as such, second image sensor 14 and second analog signal processor 24 of FIG. 1 correspond to second image sensor 618 and second analog signal processor of camera phone 600 respectively. Ex.G, Parulski, 13:53-59; Ex.D, ¶86.

To the extent that Patent Owner argues that Golan does not explicitly teaches a Tele ISP, Parulski describes a Tele ISP, specifically, a second analog signal processor. Parulski explains that in camera phone 600, "**similarly as was explained in connection with FIG. 1**," "[t]he analog output signal from the second image sensor 618 is **amplified by a second analog signal processor**." Ex.G, Parulski, 24:36-45, 13:53-56. As shown in FIG. 1 below, Parulski explains "analog output signal 14e from the **second image sensor 14 is amplified and converted to a second digital image signal by a second analog signal processor 24**." Ex.G, Parulski, 13:53-56; Ex.D, ¶87.



Ex.G, Parulski, FIG. 1, annotated

As shown in FIG. 1, Parulski also describes that image processor 50 receives data from second image sensor 14 and performs "various other image processing functions." Ex.G, Parulski, 14:57-63. Thus, in Parulski, a tele image pipeline includes analog and digital processing components (e.g., second analog signal processor 24 and image processor 50). At least Parulski's second analog signal processor 24 performs signal processing to the tele image signal from second image sensor 618, and corresponds to Tele ISP as claimed. Ex.BB, KAC-1310, 7. To the extent that Patent Owner argues that digital processing of image processor 50 is necessary to its Tele ISP, allocation of signal processing to particular components is a matter of design choice and that it was well known in the art of dual image sensor cameras to maintain separateness of Wide and Tele image pipelines through digital signal processing. Ex.AA, Lee, FIG. 2, [0031], [0036]-[0038]. Ex.D, ¶88.

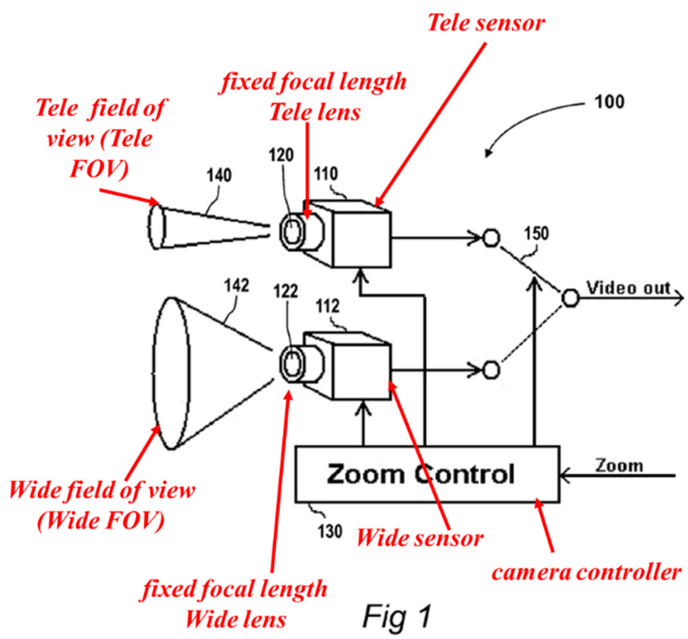
Therefore, a POSITA would have understood that in the system of Golan combined with Parulski, a zoom control sub-system 100 includes a Tele imaging section that includes a tele image sensor 110 and a tele lens 120 with fixed Tele FOV 140 narrower than fixed wide FOV

142, where the Tele imaging section is operative to provide Tele image data of object 20, and a Tele ISP (e.g., a second analog signal processor), which is operative to provide Tele image data of object 20, which teaches "*a Tele imaging section that includes a fixed focal length Tele lens with a Tele FOV that is narrower than the Wide FOV, a Tele sensor and a Tele ISP, the Tele imaging section operative to provide Tele image data of the object or scene*" as recited. Ex.D, ¶89.

[1.3] c) a camera controller operatively coupled to the Wide and Tele imaging sections,

Golan teaches a camera controller operatively coupled to the Wide and Tele imaging sections. Ex.D, ¶¶90-94.

Specifically, Golan teaches a zoom control sub-system 100 of a digital camera that includes a camera controller including a zoom control circuit 130 coupled to the Wide and Tele imaging sections. Ex.D, ¶91. As shown in annotated Fig. 1 below, Golan describes that "zoom control circuit 130 receives a required zoom from an operator of the image acquisition system, and selects the relevant image sensor (110 and 112) by activating image sensor selector 150 position." Ex.F, Golan, [0036].



Ex.F, Golan, FIG. 1, annotated

Golan further teaches that the zoom control circuit 130 "resample[s] the acquired image frame to the requested zoom." Ex.F, Golan, FIG. 2, [0048]. Specifically, zoom control circuit 130 "computes the zoom factor between the fixed zoom of the selected image acquisition device

and the requested zoom," and "performs electronic zoom on the acquired image frame to meet the requested zoom" based on the computed factor. Ex.F, Golan, [0049]; Ex.D, ¶92.

As such, Golan's zoom control circuit 130 is coupled to the Wide and Tele imaging sections to select one of the Wide and Tele imaging sections based on a requested zoom, receives an image frame acquired by the selected imaging section, and performs digital zoom to the acquired image frame to obtain an acquired image frame with said requested zoom. Ex.F, Golan, claim 1; Ex.D, ¶93.

Therefore, Golan's zoom control sub-system 100 includes a camera controller including a zoom control circuit 130 coupled to the Wide and Tele imaging sections for receiving a requested zoom and provide an acquired image frame with the requested zoom, which teaches "*a camera controller operatively coupled to the Wide and Tele imaging sections*" as recited. Ex.D, ¶94.

[1.4] the camera controller configured to combine in still mode at least some of the Wide and Tele image data to provide a fused output image of the object or scene from a particular point of view and to provide without fusion continuous zoom video mode output images of the object or scene, each output image having a respective output resolution;

The combination of Golan and Parulski renders obvious this limitation. Ex.D, ¶¶95-116. In IPR2020-00861 and IPR2020-00862, the Board relied on the combination of Golan and Parulski to find unpatentable claims reciting similar features. Ex.S, IPR2020-00862, FWD, 69-72 (Board relying on the combination of Golan and Parulski to find unpatentable claim 22 of the '332 Patent reciting similar features); Ex.R, IPR2020-00860, 69-71 (Board relying on the combination of Golan and Parulski to find unpatentable claim 20 of the '942 Patent reciting similar features).

[1.4.1] the camera controller configured to combine in still mode at least some of the Wide and Tele image data to provide a fused output image of the object or scene from a particular point of view and

The combination of Golan and Parulski renders obvious this limitation. Ex.D, ¶¶96-103.

First, Parulski discloses combining in still mode at least some of the Wide and Tele image data to provide a fused output image of the object or scene. Ex.D, ¶97. Specifically, as explained with FIG. 26 below, Parulski describes an image augmentation process may be applied to "a **still** image," which "utilizes one of the images from a dual-lens camera as a secondary image that can be used to **modify** the other, primary image and thereby generate an enhanced primary image." Ex.G,

Parulski, FIG. 26, 7:21-24, 7:32-35, 28:19-40, 29:8-14. The enhanced primary image is an output image including information from the primary image and the secondary image, and therefore teaches "*the fused output image*" as recited. Ex.G, Parulski, FIG. 26.

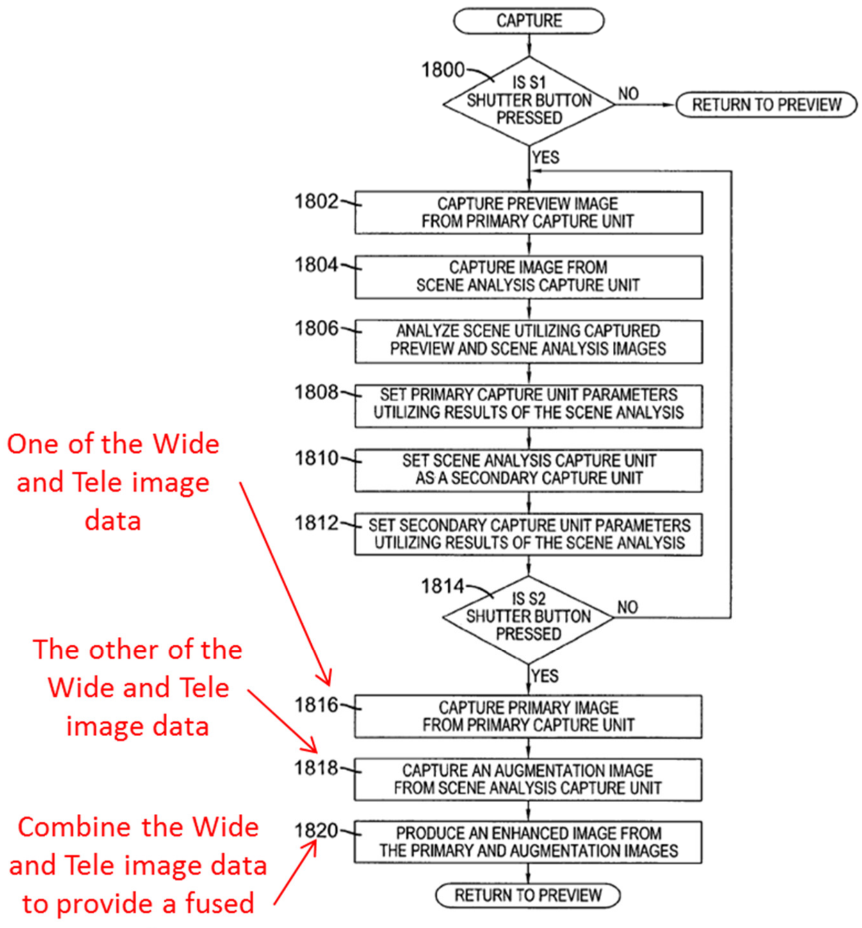


FIG. 26

Ex.G, Parulski, FIG. 26, annotated

Parulski describes different augmentation types for generating an enhanced primary image. Ex.G, Parulski, 29:29-35. For example, as shown in FIG. 14 of Parulski, a secondary still image may be used to "enhance the depth of the field of the primary image." Ex.G, FIG. 14, blocks 514, 534. Parulski also describes that the primary image and secondary image may be combined, for example, "by **replacing portions** of the primary image with portions of the secondary image," or "by **considering the pixel values of both** the primary and secondary images." Ex.G, Parulski, 29:4-7; 36-44; Ex.D, ¶98.

Second, Parulski discloses providing a fused output image from a particular point of view, e.g., from the point of view of the primary capture unit that provides the primary image. Ex.D, ¶99. For example, Parulski discloses that an enhanced primary image may be created "by **replacing portions** of the primary image with portions of the secondary image." Ex.G, Parulski, 29:4-7. A POSITA would have understood that the enhanced primary image is from the same point of view as the primary image, which is from the primary capture unit that provides the primary image. Ex.D, ¶99. For example, as shown in FIG. 2.12 of Szeliski below, it was well known in the art to use registration (e.g., in the form of homography) to map an image having a point of view from one camera to another image having a point of view from another camera, which was "commonly used in image-stitching applications." Ex.I, Szeliski, 51. A POSITA would have understood that in Parulski, when "replacing portions of the primary image with portions of the secondary image" to generate the enhanced primary image, (Ex.G, Parulski, 29:4-7), registration (e.g., in the form of homography) is used to map the secondary image that is from a point of view of a scene analysis capture unit to the primary image that is from a point of view of a primary capture unit. *See also* Ex.CC, Jacobson, 5, 57-58 (explaining that "viewpoint is the centre of the pupil of the eye of the observer," and when a scene is captured by an imaging system, "the camera lens takes the place of the eye.").

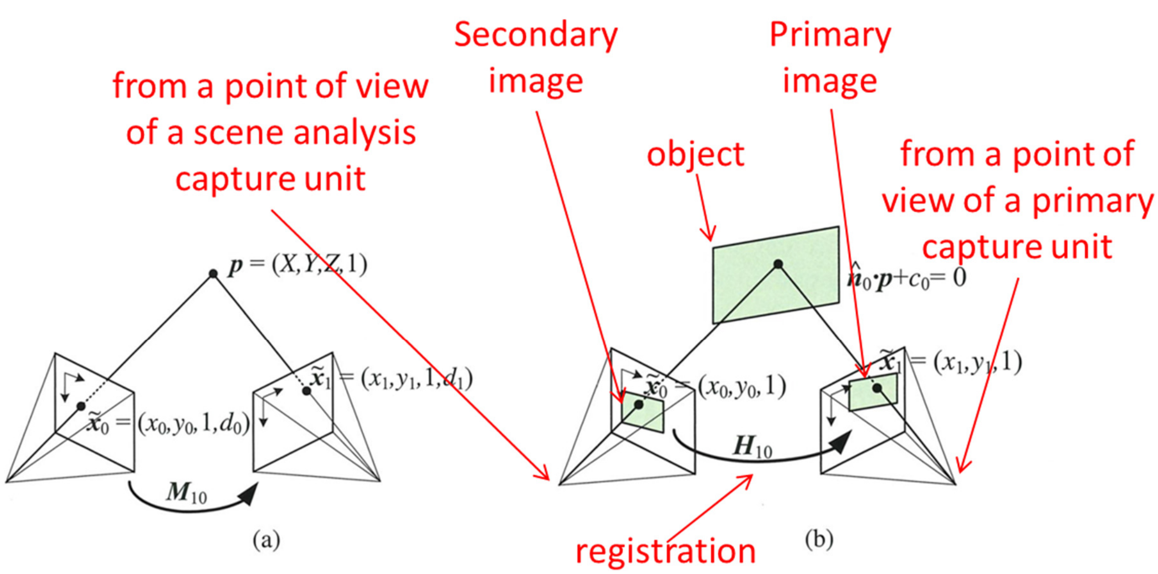


Figure 2.12 A point is projected into two images: (a) relationship between the 3D point coordinate $(X, Y, Z, 1)$ and the 2D projected point $(x, y, 1, d)$; (b) planar homography induced by points all lying on a common plane $\hat{n}_0 \cdot p + c_0 = 0$.

Ex.I, Szeliski, FIG. 2.12, annotated

Parulski's teachings of a fused output image from a particular point of view is further confirmed by Border's teachings of this feature, which is incorporated by reference in Parulski. Ex.G, Parulski, 29:51-60 (incorporating "commonly-assigned, copending U.S. patent application Ser. No. 1 1/461,574," Ex.N, Border, by reference); Ex.N, Border, [0038]-[0040], [0042],[0048] (describing that a composite image 208 is generated by modifying the wide image 204 using the telephoto image 206 with registration information (e.g., represented by homography H_{TW}) that "transforms the coordinates of the telephoto image 206 to the wide image 204" and therefore has the point of view of the wide image 204); Ex.D, ¶100. Border's teachings of providing a fused output image from a particular point of view have been confirmed by the Board in related IPR proceedings and the Federal Circuit. *See, e.g.*, Ex.S, IPR2020-00862 FWD, 66 (the Board invalidating claims 12 and 21 of the '332 Patent reciting "a fused output image of the object or scene from a particular point of view" relying on Border, stating, "We are persuaded by Petitioner's contention that Border teaches using registration information to transform coordinates of the telephoto image to the wide image and produces a composite image having the point of view of the wide image."), n21 (citing *Apple Inc. v. Corephotonics Ltd.*, IPR2018-01133, Paper 34 (PTAB Dec. 2, 2019), aff'd 857 F. App'x 641 (Fed. Cir. 2021) (nonprecedential)); Ex.T, IPR2020-00861 FWD, 65-66 and n21 (the Board invalidating claims 11 and 19 of the '898 Patent reciting similar features relying on Border).

Therefore, Parulski's camera controller including image processor 50 combines a secondary still image (one of the Wide and Tele image data) and a primary still image (the other of the Wide and Tele image data) of an object to obtain an enhanced still image (e.g., an enhanced depth of field primary image) from a point of view of the primary image. Ex.D, ¶101.

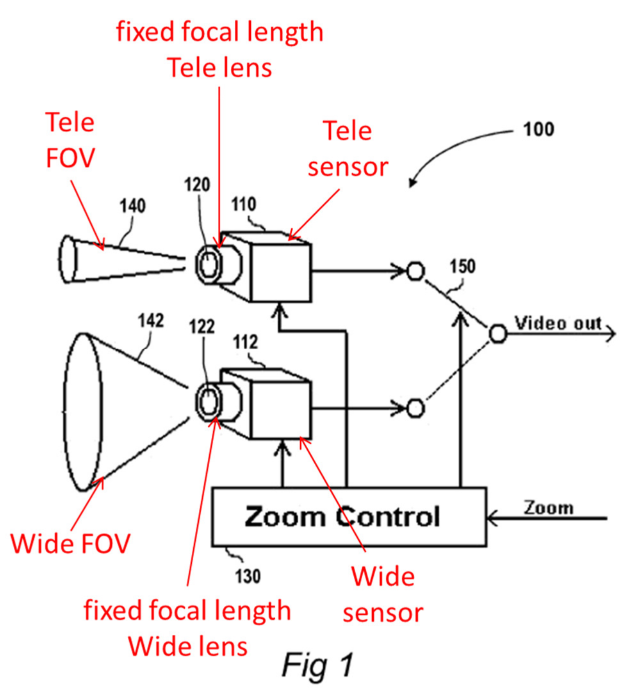
A POSITA would have been motivated to apply Parulski's teachings of in still mode, combining Wide and Tele image data (e.g., only in focused areas) to generate a fused output image in the system of Golan for the benefit of a fused output image with enhanced properties (e.g., an enhanced depth of field at a predefined range of ZF values (e.g., the predefined lossless zooming range)) in such a digital camera. Ex.D, ¶102; Ex.G, Parulski, FIG. 14 (applying the method in a zooming range both less than and greater than switch zoom position "X"), 28:52-53, 29:4-7, 30:17-20; *see also* Proposed Rejection 1: Reasons to Combine Golan and Parulski; Ex.S, IPR2020-00862 FWD, 69-72; Ex.T, IPR2020-00861 FWD, 69-72 (the Board relying on the combination of Golan's teachings of continuous zoom video without fusion and Parulski's teachings of fusion in still mode to find unpatentable claim 22 of the '332 Patent and claim 20 of the '898 Patent).

Thus, in the combination of Golan and Parulski, the zoom control sub-system 100 is adapted to apply Parulski's teaching of still mode operation in which wide image and telephoto image are combined (e.g., only in focused areas) to provide a fused output image of the object or scene from a particular point of view, which renders obvious that "*the camera controller configured to combine in still mode at least some of the Wide and Tele image data to provide a fused output image of the object or scene from a particular point of view*" as recited. Ex.D, ¶103.

[1.4.2] [the camera controller configured to…] provide without fusion continuous zoom video mode output images of the object or scene, each output image having a respective output resolution;

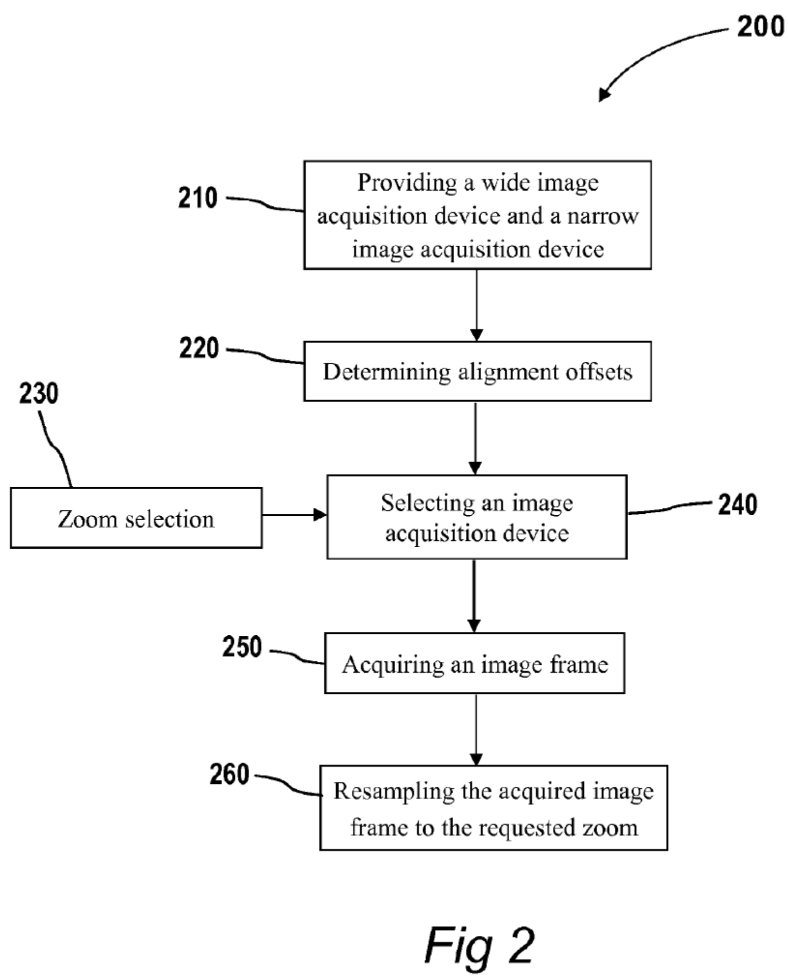
The combination of Golan and Parulski renders obvious this limitation. Ex.D, ¶¶104-110.

First, Golan discloses providing, without fusion, continuous zoom video mode output images, each output image having a respective output resolution. Ex.D, ¶105. Specifically, as illustrated in FIG. 1 below, Golan discloses zoom control subsystem 100 includes tele image sensor 110 coupled with narrow lens 120 having tele FOV 140, wide image sensor 112 coupled with wide lens 122 having wide FOV 142, zoom control module 130 and image sensor selector 150. Ex.F, Golan, [0036]-[0037], [0041]-[0044].



Ex.F, Golan, FIG. 1, annotated

Golan describes that in embodiments of FIG. 1 above and FIG. 2 below, a video output is generated by "**selecting one of the image acquisition devices** based on the requested zoom ... and performing digitally zoom on the acquired image frame, thereby obtaining an acquired image frame with the requested zoom." Ex.F, Golan, FIGS. 1, 2, Abstract, [0046]-[0049]. A POSITA would have recognized that such a video output is generated **without fusion** because an image frame of the video output is generated from only one acquired image from the selected image acquisition device, and therefore is **not** a fused output image that includes information from two images. Ex.D, ¶106.



Ex.F, Golan, FIG. 2

In comparison to providing a video output **without** fusion in embodiments of FIGS. 1 and 2, Golan's embodiment of FIG. 6 includes "**fusion module 660**" that performs fusion using images 630

and 632 to provide output image frame 650, which "has the resolution of image sensor 610 ... **and** the color of image sensor 612." Ex.F, Golan, FIG. 6, [0064], [0067]; Ex.D, ¶107.

Further, Golan discloses providing continuous zoom video mode images. Ex.D, ¶108. Specifically, Golan describes that zoom control sub-system 10 may perform a "**continuous** zoom process 200" of FIG. 2, and provide a video output with "**continuous electronic zoom capabilities with uninterrupted imaging**" by using "**continuous digital-zoom values**." Ex.F, Golan, FIG. 3, [0040]-[0041], [0051]-[0053].

Golan also discloses each output image having a respective output resolution, confirmed by the Board in related IPRs. Ex.D, ¶109; *see also* Ex.Q, IPR2020-00487 FWD, 48-49 (The Board finding that Petitioner, relying on a combination with Golan, establishes unpatentability of claim 7 of the '233 Patent, reciting "wherein each output image has a respective output resolution, wherein at the lower ZF value the output resolution is determined by the Wide sensor and wherein at the higher ZF value the output resolution is determined by the Tele sensor"). Specifically, as shown in FIG. 2, Golan uses "[s]tep 260: **resampling** the acquired image frame **to the requested zoom**" to generate the output image frame. Ex.F, Golan, [0047]-[0049]. A POSITA would have understood that Golan's resampling process includes upsampling or downsampling to generate the output image, and each output image therefore has a respective resolution.

Therefore, in the combination of Golan and Parulski, a camera controller is configured to, in video mode, provides without fusion continuous zoom video mode output images of the object or scene, each output image having a respective output resolution, which renders obvious the camera controller configured "*to provide without fusion continuous zoom video mode output images of the object or scene, each output image having a respective output resolution*" as recited. Ex.D, ¶110.

[1.4.3] …provide a fused output image of the object or scene [in still mode]…and to provide without fusion continuous zoom video mode output images…

The combination of Golan and Parulski renders obvious this limitation. Ex.D, ¶¶111-116.

First, as discussed at [1.4.1] and [1.4.2], in the combination of Golan and Parulski, the camera controller is configured to in still mode, provide a fused output image of the object or scene from a particular point of view, and to provide without fusion continuous zoom video mode output images of the object or scene, each output image having a respective output resolution. Ex.D, ¶112.

Second, to the extent that Patent Owner argues that Golan and Parulski, alone or in combination, do not disclose its alleged inventive feature of different configurations for still mode and video mode, i.e., "combining images from two different cameras for still images, but not for video" (*see*, Ex. W, PO's Preliminary Response, 13), PO is incorrect. Parulski itself teaches this feature; the combination of Golan and Parulski teaches this feature; and the Board has confirmed that the combination of Golan and Parulski teaches this feature. Ex.D, ¶113.

Specifically, as discussed at VII.A.2, a POSITA would have understood that Parulski teaches that one design choice in some circumstances is applying fusion for still (as shown in FIG. 14) but not for video (e.g., as shown in FIG. 8), which has the benefit of addressing "special problem[s] arising during video capture." *See, e.g.*, Ex.G, Parulski, 6:59-7:3. Ex.D, ¶114.

Further, as discussed at VII.A.3 and confirmed by the Board, in the combination of Golan and Parulski, a person of ordinary skill "would have been motivated to apply Parulski's teachings of still mode fusion to a still mode of Golan, while in video mode, maintaining Golan's design choice of video switching without fusion (e.g., for the benefit of reduced computation power of video switching over video fusion)." Ex.S, IPR2020-00862 FWD, 69-72; *see also* Ex.T, IPR2020-00861 FWD, 69-71; Ex.D, ¶115.

Therefore, in the combination of Golan and Parulski, a camera controller is configured to provide a fused output image in still mode, and provide without fusion continuous zoom video mode output images, which renders obvious the camera controller configured "*the camera controller configured to combine in still mode at least some of the Wide and Tele image data to provide a fused output image of the object or scene from a particular point of view and to provide without fusion continuous zoom video mode output images of the object or scene, each output image having a respective output resolution*" as recited. Ex.D, ¶116.

[1.5] wherein the video output images are provided with a smooth transition when switching between a lower zoom factor (ZF) value and a higher ZF value or vice versa,

Golan teaches this limitation. Ex.D, ¶¶117-121.

Specifically, Golan discloses that video output images are provided with smooth transition when switching between wide image sensor 112 (Wide sensor) and tele image sensor 110 (Tele sensor). Ex.D, ¶118. Specifically, Golan teaches using a calibration process to "determine the **alignment offsets between wide image sensor array 110 and tele image sensor array 112**" with "sub-pixel accuracy." Ex.F, Golan, [0045]. By using the calibrated, high accuracy

alignment offsets between Wide and Tele sensors to provide "**continuous electronic zoom with uninterrupted imaging, when switching back and forth between the wide image sensor array and the tele image sensor array**," jumps (discontinuity) in video output images when switching between Wide and Tele sensors (and their corresponding point of views) are minimized. Ex.F, Golan, Abstract, [0045]. As such, Golan discloses providing video output images with a smooth transition when switching between Wide sensor and Tele sensor facilitated by "electronic calibration step [] performed on each pair of adjacently disposed image sensor arrays."

Golan describes using electronic calibration to achieve smooth transition with uninterrupted imaging when switching between Tele and Wide images in video by addressing parallax shift in the Tele and Wide images. Ex.D, ¶119. Golan's Tele and Wide images captured by Tele sensor 110 and Wide sensor 112 include parallax information, including position shifts of the objects in Tele and Wide images due to the distance between the two image sensors. These images may be referred to as parallax images. A viewer may observe a discontinuity/jump when switching between the Tele and Wide images because of the position shift in the parallax images. Golan describes using electronic calibration to achieve smooth transition with uninterrupted imaging when switching between Tele and Wide images in video by addressing such a parallax shift. Electronic calibration was a well-known technique to determine the correspondences between the coordinate systems represent the registration between in parallax images. Ex.N, Border, [0041]-[0042] ("The correspondences between the coordinate systems represent the registration between the wide image 204 and the telephoto image 206. The correspondences are preferably determined at the time of manufacture by shooting test targets, as is well known in the art."). A POSITA would have understood that in Golan, the correspondences between the coordinated systems of the Wide and Tele imaging systems determined using electronic calibration are used for position matching the Wide and Tele images to cancel the parallax shift, thereby achieving smooth transition with uninterrupted imaging. The 291 Patent itself describes that a "'smooth transition' is a transition between cameras or POVs that minimizes the jump effect. This may include matching the position, scale, brightness and color of the output image before and after the transition." Ex.A, '291 Patent, 10:17-21.

In fact, it was well-known that numerous camera design and image processing methods were well known for providing video output images with a smooth transition when switching

between two adjacent sensors. *See e.g.*, Ex.K, Konno, 14; Ex.I, Szeliski, FIGS. 2.12, 6.2-6.3, 50-51, 275-278; Ex.H, Scarff, 4:12-26; Ex.N, Border, [0041]-[0042]; Ex.D, ¶120.

Accordingly, Golan teaches that in video mode, the camera controller is configured to provide, without fusion, video output images with continuous electronic zoom with uninterrupted imaging when switching back and forth between the Wide sensor and Tele sensor, where Wide sensor is used to capture video image at a lower ZF value less than or equal to zoom factor X and Tele sensor is used to capture video image at a higher ZF value greater than zoom factor X, which teaches that "*the video output images are provided with a smooth transition when switching between a lower zoom factor (ZF) value and a higher ZF value or vice versa*" as recited. Ex.D, ¶121.

[1.6] wherein at the lower ZF value the output resolution is determined by the Wide sensor, and wherein at the higher ZF value the output resolution is determined by the Tele sensor.

Golan teaches this limitation. Ex.D, ¶¶122-123. In IPR2020-00487 and IPR2020-00860, the Board relied on Golan to find unpatentable claims reciting similar features. Ex.Q, IPR2020-00487 FWD, 48-49 (Board relying on Golan to find unpatentable claim 7 of the '233 Patent, reciting "wherein each output image has a respective output resolution, wherein at the lower ZF value the output resolution is determined by the Wide sensor and wherein at the higher ZF value the output resolution is determined by the Tele sensor"); Ex.R, IPR2020-00860, 56-57 (Board relying on Golan to find unpatentable claims 4 and 22 of the '942 Patent reciting similar features).

First, as discussed at [1.5], Golan teaches that video output images are provided with a smooth transition when switching between a lower zoom factor (ZF) value and a higher ZF value or vice versa, where video image at the lower ZF value (e.g., equal to or lower than zoom factor X) is provided by Wide sensor, and video image at the higher ZF value (e.g., greater than zoom factor X) is provided by Tele sensor. Ex.D, ¶122.

Second, as discussed above at [1.4.2], Golan's resampling process generates an output image with a particular resolution from the image frame acquired from either the wide or tele sensor based on requested zoom. A POSITA would have understood that resolution of the acquired image frame is determined by the sensor (e.g., its sensor resolution) that acquires the image frame, and as such, the

output resolution of the video output image is determined by the respective sensor and the requested zoom. *Id.*; *see, e.g.*, Ex.F, Golan, [0004]-[0005]; Ex.G, Parulski, 23:58-61; Ex.D, ¶122.

In the combination of Golan and Parulski, when switching between Wide and Tele sensors in video mode, at the lower ZF value, Wide image data from Wide sensor is used to provide the corresponding video output image. As such, the resolution of the corresponding video output image at the lower ZF value is determined by the Wide sensor. At the higher ZF value, Tele image data from Tele sensor is used to provide the corresponding video output image. *Id.* As such, the resolution of the video output image at the higher ZF is determined by the Tele sensor. *Id.* Therefore, the combination of Golan and Parulski renders obvious "*wherein at the lower ZF value the output resolution is determined by the Wide sensor, and wherein at the higher ZF value the output resolution is determined by the Tele sensor*" as recited in the claim. Ex.D, ¶123.

5. Claim 2 would have been obvious over Golan and Parulski.

> ***[2.0] The camera of claim 1, wherein the controller includes a user control module for receiving user inputs and a sensor control module for configuring each sensor to acquire the Wide and Tele image data based on the user inputs.***

The combination of Golan and Parulski renders obvious this limitation. Ex.D, ¶¶124-127. The Board has previously found, consistent with the analysis here, in IPR2020-00861 and IPR2020-00862, Golan teaches this feature. Ex.S, IPR2020-00862 FWD, 56 (Board finding unpatentable claim 9 of the '332 Patent reciting a similar features including "*wherein the camera controller includes a user control module for receiving user inputs and a sensor control module for configuring each sensor to acquire the Wide and Tele image data based on the user inputs,*" over the combination of Golan and two additional references where Golan teaches the recited features, and the two additional references were relied upon for features in independent claim 1 that claim 8 depends from); Ex.T, IPR2020-00861 FWD, 57-58 (Board finding unpatentable claim 8 of the '898 Patent reciting similar features over the combination of Golan and two additional references wherein Golan teaches the recited features).

First, Golan teaches that zoom control sub-system 100 includes a camera controller including a zoom selecting control (a user control module) for receiving user inputs including zoom factor user inputs. Specifically, Golan teaches "providing **a user** of the image acquisition device with **a zoom selecting control**, thereby obtaining **a requested zoom**." Ex.F, Golan,

Abstract; *see also* Ex.F, Golan, FIG. 2, [0045]-[0046] ("Step 230 zoom selection. A user of the image acquisition selects the required zoom."); claim 1; Ex.D, ¶125.

Second, Golan teaches that zoom control sub-system 100 includes a camera controller including a zoom control circuit 130 (sensor control module) for configuring each sensor to acquire the Wide and Tele images based on user inputs that include zoom factor user inputs. In Golan's zoom control sub-system 100, "[z]oom control circuit 130 **receives a required zoom** from an operator of the image acquisition system, and **selects the relevant image sensor (110 and 112) by activating image sensor selector 150 position**" based on the user inputs including the user input zoom factors. Ex.F, Golan, [0039]; [0047]-[0048] ("The zoom control 130 selects an image acquisition device with the having a zoom more proximal to the requested zoom," and "[a]n image frame is acquired by the selected image acquisition device.") A POSITA would have understood that image sensor selector 150 of zoom control sub-system 100 to be substantially similar to image sensor selector 750 of camera system 600, and that zoom control sub-system 100 teaches selecting one image sensor and not the other to be bypassed in such circumstances. *See e.g.*, Ex.F, Golan, [0066] ("[w]hen image sensor selector 750 closes contact 752, monochrome image sensor 610 is **bypassed** and **only color image sensor 612 [] is in operation**."); Ex.D, ¶126.

Accordingly, the digital camera of Golan and Parulski includes zoom control sub-system 100, which includes a zoom selecting control (a user control module) for receiving user inputs including zoom factor user inputs, and a zoom control circuit 130 (sensor control module) for configuring each sensor to acquire the Wide and Tele images based on the user inputs (e.g., the user provided zoom factors), which renders obvious that "*the controller includes a user control module for receiving user inputs and a sensor control module for configuring each sensor to acquire the Wide and Tele image data based on the user inputs*" as recited in the claim. Ex.D, ¶127.

6. Claim 4 would have been obvious over Golan and Parulski.

[4.0] The camera of claim 2, wherein the sensor control module has a setting that depends on the Wide and Tele fields of view and on a sensor oversampling ratio, the setting used in the configuration of each sensor.

The combination of Golan and Parulski renders obvious this limitation. Ex.D, ¶¶128-136.

First, the combination of Golan and Parulski discloses a camera controller configured to provide without fusion continuous zoom video mode output images of the object or scene as discussed at [1.5], and discloses a sensor control module of the camera controller for configuring each sensor to acquire the Wide and Tele image data based on the user inputs as discussed at [2.0]. Ex.D, ¶129.

Second, and more specifically, Golan discloses that in a video mode, a switch setting for switching back and forth between Wide and Tele sensors in digital zoom depends on a sensor oversampling ratio (e.g., with a value of 6.48). Ex.D, ¶130. Specifically, Golan teaches "continuous electronic zoom with uninterrupted imaging is also **maintained when switching back and forth between adjacently disposed image sensors**." Ex.F, Golan, [0040]. Golan explains that while typically some information is lost in the process of electronic zoom, (Ex.F, Golan, [0003]), **"[t]he ratio between the image sensor resolution and the output resolution <u>dictates the lossless electronic zoom range</u>**." Ex.F, Golan, [0004]. Golan explains that maximal lossless electronic zoom may be computed using a sensor oversampling ratio, and in an example of "a 5 Megapixel, 2592x1944, image sensor array and an output resolution frame of 400x300" in a video stream, "yields **maximal lossless electronic zoom of 6.48: 2592/400=6.48**." Ex.F, Golan, [0004]-[0005].

Thus, a POSITA would have recognized that Golan's maximal lossless electronic zoom is a sensor oversampling ratio, PL_{Wide}/PL_{video}. PL_{Wide} is an in-line number (2592) of Wide sensor pixels of Wide sensor 112, and PL_{video} (400) is an in-line number of output video format pixels. In Golan's example, based on the 2592/400 sensor oversampling ratio, an electronic zoom (or digital zoom) up to 6.48x can be considered lossless. Ex.D, ¶131.

Accordingly, a POSITA would have understood Golan to teach a switch setting for switching between Wide and Tele sensors at a zoom factor that depends on the maximal lossless electronic zoom (e.g., to be less than the maximal lossless electronic zoom) to obtain "a **<u>large lossless</u> zooming range**." Ex.F, Golan, [0008]. Therefore, the switch setting, e.g., the zoom factor at which switching between Wide and Tele sensors occurs, depends on the sensor oversampling ratio. Ex.D, ¶132.

Third, Golan teaches that its switch setting depends on the Wide and Tele fields of view. Ex.D, ¶¶133-134. Specifically, Golan explains that "[u]sing two (or more) image sensors, having different fixed FOV, facilitate a light weight electronic zoom with **<u>a large lossless zooming</u>**

range." Ex.F, Golan, [0009]. Golan explains that in an example, such a large lossless zooming range has a value of (Wide_FOV/Narrow_FOV)^2, which is provided by "switching between the image sensors" and performing digital zoom to both Wide and Tele images. Ex.F, Golan, [0009]. A POSITA would have understood that the underlying geometric relationships and as such, would have understood that Golan's terminology, "Wide_FOV/Narrow_FOV," corresponds to the relative magnification ratio of an object "**magnified** in tele image sensor 110 with respect to wide image sensor 112," thereby representing the ratio Tan(θ_wide)/Tan(θ_tele), where θ_wide and θ_tele are the corresponding semi-angle of view θ such as illustrated in Fig. 4.13 of Jacobson below. Ex.F, Golan, [0037]; Ex.CC, Jacobson, FIG. 4.13. Accordingly, a POSITA would have understood that Golan teaches that the switch setting, e.g., the zoom factor at which switching between Wide and Tele sensors occurs, depends on the relative magnification ratio of Tele image to the Wide image, which in turn depends on the Wide and Tele fields of view.

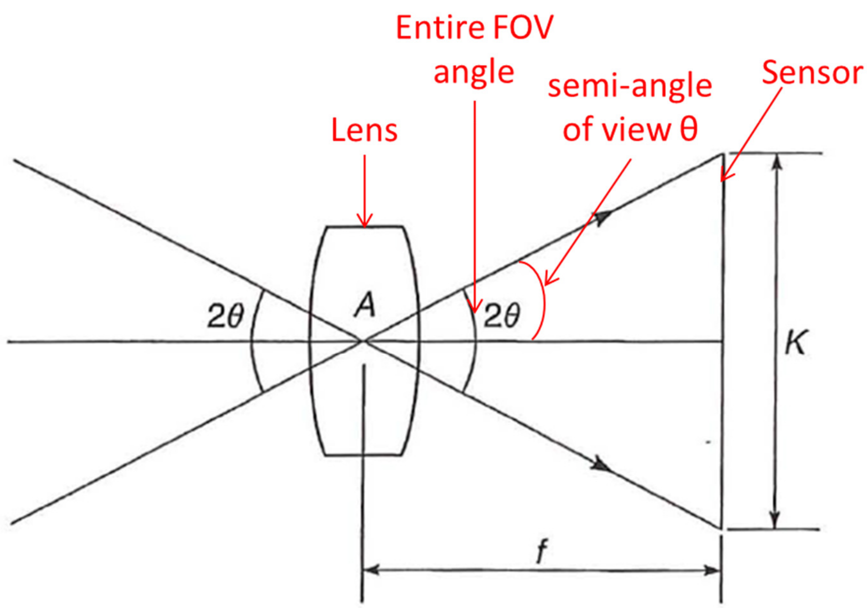
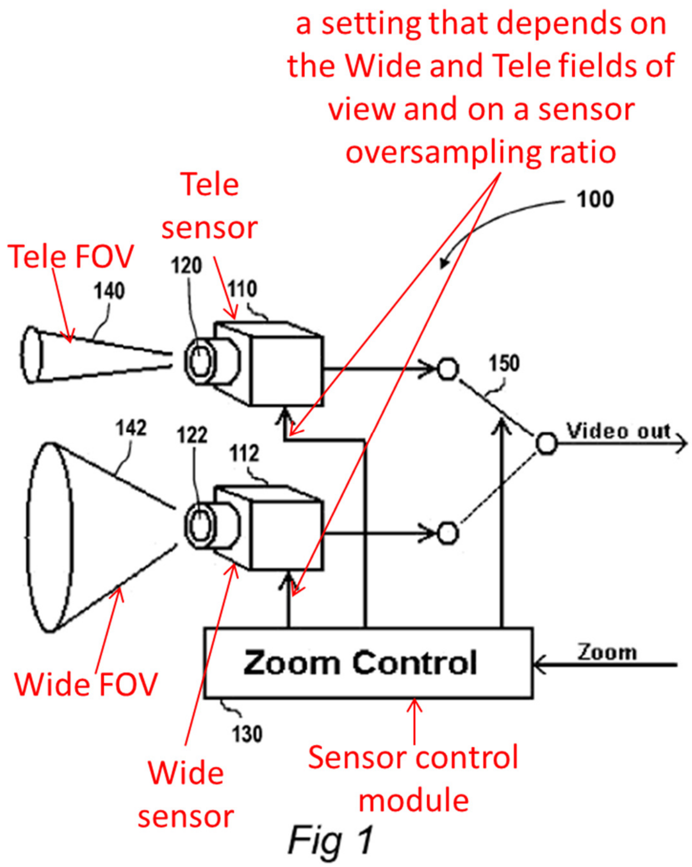


Figure 4.13 Field (angle) of view (FOV) of a lens related to format dimension

Ex.CC, Jacobson, FIG. 4.13, annotated

Golan teaches that the switch setting is used to "select[] the relevant image sensor." Ex.D, ¶135. Specifically, as shown in Figure 1 of Golan below, a zoom control 130 (sensor control module) "receives a required zoom from an operator of the image acquisition system, and **selects the relevant image sensor** (110 and 112) by activating image sensor selector 150 position."

Ex.F, Golan, [0039]. A POSITA would have understood Golan to teach selecting one image sensor and not the other to be operational in such circumstances.



Ex.F, Golan, FIG. 1, annotated

Therefore, in the system of Golan with Parulski, a camera controller includes a sensor control module having a switch setting for selecting one of the Wide and Tele sensors to be operable for capturing the corresponding Wide/Tele image data. The switch setting includes a switching zoom factor at which switching between Wide and Tele sensors occurs that depends on the Wide and Tele fields of view and on a sensor oversampling ratio, and is used to configure each of the Wide and Tele sensors such that the selected image sensor is in an operating mode while the other non-selected image sensor is in a non-operating mode (e.g., a standby or turned-off mode). *Id.* Therefore, the combination of Golan and Parulski renders obvious that "*the sensor control module has a setting that depends on the Wide and Tele fields of view and on a sensor oversampling ratio, the setting used in the configuration of each sensor*" as recited in the claim. Ex.D, ¶136.

7. Claim 5 would have been obvious over Golan and Parulski.

[5.0] The camera of claim 4, wherein the Wide and Tele FOVs and the sensor oversampling ratio satisfy the condition $0.8*PL_{Wide}/PL_{video}<Tan(FOV_{Wide})/Tan(FOV_{Tele})<1.2*PL_{Wide}/PL_{video}$, wherein PL_{Wide} is an in-line number of Wide sensor pixels and wherein PL_{video} is an in-line number of output video format pixels.

Golan teaches this limitation. Ex.D, ¶¶137-141.

As discussed at [4.0], Golan teaches a sensor oversampling ratio PL_{Wide}/PL_{video} having a value of 6.48, where PL_{Wide} is an in-line number (e.g., 2592) of Wide sensor pixels of Wide sensor 112, and PL_{video} (e.g., 400) is an in-line number of output video format pixels, as claimed. Ex.D, ¶138.

Second, Golan teaches $Tan(FOV_{Wide})/Tan(FOV_{Tele})$ having a value of 6. Ex.F, Golan, [0009]; Ex.D, ¶139. More specifically, Golan explains that, in the example where "**Wide_FOV=Narrow_FOV * 6**," "switching between the image sensors provide a lossless electronic zoom of 6^2=36." Ex.F, Golan, [0009]; As discussed at [4.0], Golan's informal terminology, "Wide_FOV/Narrow_FOV," is used to represent the ratio Tan(θ_wide)/Tan(θ_tele), where θ_wide and θ_tele are the corresponding semi-angle of view θ, accordingly teaches "$Tan(FOV_{Wide})/Tan(FOV_{Tele})$" as claimed.

Accordingly, in Golan, a sensor oversampling ratio PL_{Wide}/PL_{video} has a value of 6.48 and $Tan(FOV_{Wide})/Tan(FOV_{Tele})$ has a value of 6, which satisfy $0.8*PL_{Wide}/PL_{video}<Tan(FOV_{Wide})/Tan(FOV_{Tele})<1.2*PL_{Wide}/PL_{video}$, specifically, $0.8*6.48<6<1.2*6.48$. Ex.D, ¶140.

Therefore, in the combination of Golan and Parulski, an imaging acquisition system and its components, including its fixed focal length Wide lens, Wide sensor, fixed focal length Tele lens, and output video format pixels, are configured such that PL_{Wide}/PL_{video} (e.g., 6.48) and $Tan(FOV_{Wide})/Tan(FOV_{Tele})$ (e.g., 6) satisfies limitation [5.0], which renders obvious that "*the Wide and Tele FOVs and the sensor oversampling ratio satisfy the condition $0.8*PL_{Wide}/PL_{video}<Tan(FOV_{Wide})/Tan(FOV_{Tele})<1.2*PL_{Wide}/PL_{video}$, wherein PL_{Wide} is an in-line number of Wide sensor pixels and wherein PL_{video} is an in-line number of output video format pixels*" as recited in the claim. Ex.D, ¶141.

8. Claim 6 would have been obvious over Golan and Parulski.

***[6.0] The camera of claim 1, wherein the Tele lens includes a ratio of total [track] length (TTL)/effective focal length (EFL) smaller than 1.*[4]**

The combination of Golan and Parulski renders obvious this limitation. Ex.D, ¶¶142-145. In IPR2020-00860, IPR2020-00861, and IPR2020-00862, the Board relied on the combination of Golan and Parulski to find unpatentable claims reciting similar features. Ex.R, IPR2020-00860 FWD, 70 (Board stating "we determine that a POSITA would have understood Golan's and Parulski's tele or telephoto lenses to have a ratio of TTL/EFL that is less than one" and invalidating claim 8 of the '942 Patent reciting similar features); Ex.S, IPR2020-00862 FWD, 68-69 (Board relying on the combination of Golan and Parulski to find unpatentable claim 11 of the '332 Patent reciting similar features); Ex.T, IPR2020-00861 FWD, 67-68 (Board relying on the combination of Golan and Parulski to find unpatentable claim 10 of the '898 Patent reciting similar features).

As discussed at [1.2], the digital camera of Golan includes a Tele lens 120. Ex.F, Golan, FIG. 1, [0036]-[0037]; *see also* Ex.F, Golan, Abstract ("a computerized image acquisition system [] having … **<u>a tele image acquisition device</u>** having a tele image sensor array coupled with **<u>a tele lens</u>** having a narrow FOV"). A POSITA would have understood that Golan's tele lens 120 is a telephoto lens, which by definition, has a telephoto ratio smaller than 1 ("less than unit"). *See, e.g.*, Ex.HH, Smith, 169 ("The arrangement shown in Fig. 10.1, with a positive component followed by a negative component, can produce a compact system with an **<u>effective focal length F</u> that is longer than <u>the overall length L</u> of the lens**. **The ratio of L/F is called the <u>telephoto ratio</u>**, and a lens for which this ratio is less than unit is **<u>classified as a telephoto lens</u>**."). A POSITA would understand the "telephoto ratio" of Smith is the same as the claimed TTL/EFL ratio, since TTL and L both refer to the overall length of the lens (*see*

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[4] Claim element [6.0] provides "*a ratio of total [sic] length (TTL)....*" Ex.A, 13:41-43. Omission of "track" in "total length" appears to be an obvious error susceptible to correction. *See* Ex.A, 12:16 ("total track length (TTL)"). For purposes of this Request, Requester assumes that "total track length" is the appropriate correction and has applied the art accordingly. Ex.D, n1.

Ex.Z, Chen, 3:24-26), and F is described as the effective focal length of the lens system. Ex.HH, Smith, 169. A POSITA would understand Smith's "telephoto ratio" to apply to Golan's tele lens 120 such that the ratio of overall length to effective focal length of tele lens 120 (i.e., TTL/EFL) is less than 1. Ex.D, ¶143.

Second, to the extent that Patent Owner argues that Golan does not explicitly describe tele lens 120 as a telephoto lens as claimed, it would have been obvious to a POSITA to implement Golan's tele lens 120 with "a fixed focal length **telephoto lens**" as taught in Parulski for the benefit of a "very small figure" by obtaining a more compact lens Ex.G, Parulski, FIGS. 16A-B, 23:38, 24:20-21 (describing Tele imaging section includes second lens 616 that is "a fixed focal length telephoto lens" having a "very small figure"); *see also*, Ex.HH, Smith, 169 (describing using a telephoto lens for "produc[ing] a compact system"). As previously explained, the definition of a "telephoto lens" would be understood by a POSITA to have a TTL/EFL smaller than 1. Ex.D, ¶144.

Therefore, in the combination of Golan and Parulski, an imaging acquisition system includes a Tele (i.e. telephoto) lens, which has a telephoto ratio of total track length (TTL)/effective focal length (EFL) smaller than 1, which teaches "*the Tele lens includes a ratio of total [track] length (TTL)/effective focal length (EFL) smaller than 1*" as recited in the claim. Ex.D, ¶145.

9. Claim 10 would have been obvious over Golan and Parulski.

[10.0] The camera of claim 1, wherein the camera controller configuration to provide video output images with a smooth transition when switching between a lower ZF value and a higher ZF value or vice versa includes a configuration that uses information either from the Wide sensor or from the Tele sensor.

The combination of Golan and Parulski teaches limitation [10.0]. Ex.D, ¶¶146-149.

First, as discussed at [1.5] and [1.6], the combination of Golan and Parulski teaches that video output images are provided with a smooth transition when switching between lower and higher ZF values, or vice versa, wherein at lower ZF value the output video image is generated using Wide image data provided by Wide sensor, and wherein at the higher ZF value the output video image is generated using Tele image data provided by Tele sensor. Ex.D, ¶147.

Second, as discussed at [4.0], Golan teaches selecting one image sensor and not the other to be operational when switching back and forth between adjacently disposed image sensors, and Parulski reinforces this teaching. Parulski teaches a "digital camera using multiple lenses and image sensors to provide an improved zoom range" without providing the image augmentation process, in which "**only one** of the two image sensors **is used at a time**" and in which "[t]he two image sensors do **not** simultaneously capture images." Ex.G, Parulski, 5:21-35; As such, a POSITA would have recognized that the camera controller configuration to provide video output images with a smooth transition includes a configuration that uses information (Wide or Tele image data) either from Wide sensor or from Tele sensor. Ex.D, ¶148.

In the combination of Golan and Parulski, the camera controller including image processor is configured to provide video output images with continuous electronic zoom with uninterrupted imaging when switching back and forth between the Wide sensor and Tele sensor, which includes a configuration that uses either Wide image data from the Wide sensor or Tele image data from the Tele sensor. Therefore, the combination of Golan and Parulski renders obvious that "*the camera controller configuration to provide video output images with a smooth transition when switching between a lower ZF value and a higher ZF value or vice versa includes a configuration that uses information either from the Wide sensor or from the Tele sensor*" as recited in the claim. Ex.D, ¶149.

10. Claim 11 would have been obvious over Golan and Parulski

> ***[11.0] The camera of claim 1, wherein the camera controller configuration to provide video output images with a smooth transition when switching between a lower ZF value and a higher ZF value or vice versa includes a configuration that uses at high ZF secondary information from the Wide camera and uses at low ZF secondary information from the Tele camera.***

The combination of Golan and Parulski renders obvious this limitation. Ex.D, ¶¶150-160. In IPR2020-00487 and IPR2020-00860, the Board relied on the combination of Golan and Parulski to find unpatentable claims reciting similar features. Ex.Q, IPR2020-00487 FWD, 55-57 (Board relying on the combination of Golan and Parulski to find unpatentable claims 9 and 18 of the '233 Patent reciting similar features); Ex.R, IPR2020-00860 FWD, 63-66 (Board relying on the combination of Golan and Parulski to find unpatentable claims 6, 7, 24, and 25 of the '942 Patent reciting similar features).

First, as discussed at [1.5], Golan teaches providing video output images with a smooth transition during the switching between Wide and Tele images, wherein at lower and higher ZF values, the output image is from the Wide and Tele sensors respectively, which teaches the "*the camera controller configuration to provide video output images with a smooth transition when switching between a lower ZF value and a higher ZF value or vice versa*." Ex.D, ¶151.

Second, Parulski teaches during switching between Wide and Tele images in zoom output images, at the lower ZF value, the primary capture unit is the Wide imaging section providing the video output image, and at the higher ZF value, the primary capture unit is the Tele imaging section. Ex.D, ¶¶152-153. As shown in annotated FIG. 8 below, Parulski teaches "capturing video images" using a digital camera including multiple lenses and multiple sensors. Ex.G, Parulski, 18:25-27. A POSITA would have understood that the method of FIG. 8 would be implemented in image capture assembly 610 of FIGS. 16A and 16B, which includes a Wide imaging section including wide lens 612 and wide sensor 614, and a Tele imaging section including tele lens 616 and tele sensor 618. Ex.G, Parulski, 23:28-43.

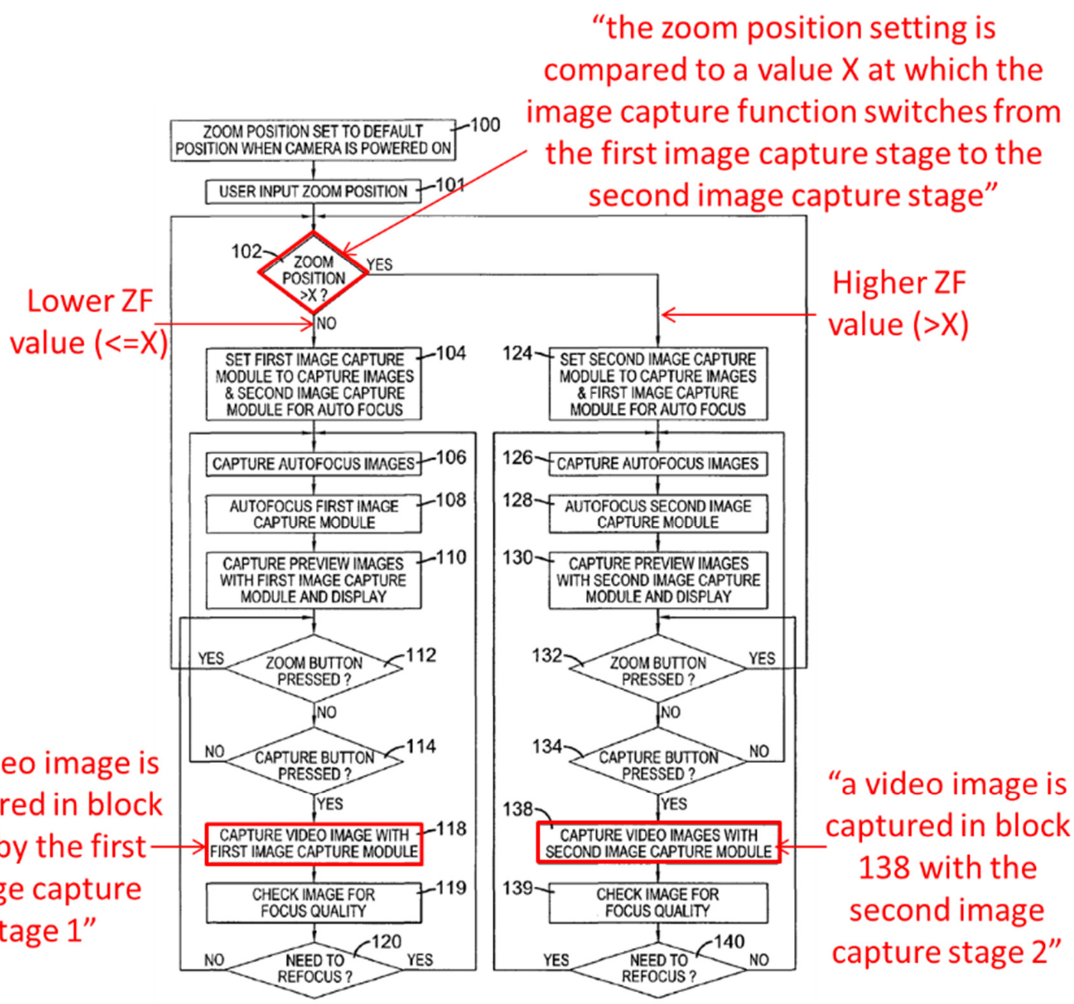


FIG. 8

Ex.G, Parulski, FIG. 8, annotated

Parulski teaches that at block 102, "the zoom position setting is **compared to a value X** at which the image capture function **switches from the first image capture stage to the second image capture stage**." Ex.G, Parulski, 15:54-57, 18:27-29. When switching to a lower ZF value (less than or equal to switch zoom position "X"), at block 118, "a video image is captured in block 118 by the first image capture stage 1," which corresponds to the Wide imaging section of image capture assembly 610. Ex.G, Parulski, 18:37-38. When switching to a higher ZF value (greater than switch zoom position "X"), at block 138, "a video image is captured in block 138 with the second image capture stage 2," which corresponds to the Tele imaging section of image capture assembly 610. Ex.G, Parulski, 18:52-53. Ex.D, ¶154.

Third, Parulski teaches that the camera controller configuration to provide video output images during switching includes a configuration to use, at high and low ZFs, secondary information from the Wide and Tele imaging sections respectively. Ex.D, ¶¶155-156. Specifically, Parulski teaches a process "for selecting one of the imaging stages in a dual lens camera system as the primary capture unit, while relegating the other imaging stage to certain other functions, such as scene analysis," which is "designated as the scene analysis capture unit." Ex.G, Parulski, 25:16-20; 25:46-47. Parulski teaches "set[ting] the **primary capture unit parameters** utilizing the scene analysis data obtained by **the scene analysis capture unit**." Ex.G, Parulski, 26:18-20; *see also* Ex.G, FIGS. 20-22 and 24-26. "Such **scene analysis data** could include without limitation **exposure data**,... **color balance**,… etc., and the **capture unit parameters** could include without limitation **aperture value, exposure time, focus position, white balance, ISO setting**, etc." Ex.G, Parulski, 25:62-26:1.

As such, Parulski teaches that during the switching between Wide and Tele images, at the lower ZF value (equal to or less than switch zoom position X), secondary information (e.g., exposure data, color balance, white balance gain, exposure time) from the scene analysis capture unit (Tele imaging section) is used to set the capture unit parameters of the primary capture unit (Wide imaging section). Similarly, during the switching, at the higher ZF value (greater than switch zoom position X), secondary information from the scene analysis capture unit (Wide imaging section) is used to set the capture unit parameters of the primary capture unit (Tele imaging section). Ex.D, ¶157.

It is noted that the '291 Patent provides that "'secondary information' refers **to white balance gain, exposure time**, analog gain and color correction matrix." Ex.A, 4:57-59.

A POSITA would have been motivated to apply Parulski's teachings of during switching, using, at high and low ZFs, secondary information from the Wide and Tele imaging sections respectively in Golan to achieve the benefit of "improved imaging capability in a multi-lens digital camera" as taught by Parulski. Ex.G, Parulski, 1:7-10; *see also* Proposed Rejection 1: Reasons to combine Golan and Parulski; Ex.D, ¶159.

Therefore, in the combination of Golan and Parulski, a digital camera includes a camera controller configured to, during switching between lower and higher ZF values, use, at high and low ZFs, secondary information from the Wide and Tele imaging sections respectively, which teaches "*wherein the camera controller configuration to provide video output images with a*

smooth transition when switching between a lower ZF value and a higher ZF value or vice versa includes a configuration that uses at high ZF secondary information from the Wide camera and uses at low ZF secondary information from the Tele camera" as recited in the claim. Ex.D, ¶160.

11. Claim 12 would have been obvious over Golan and Parulski.

[12.0] A method for obtaining zoom images of an object or scene in both still and video modes using a digital camera, the method comprising the steps of:

The combination of Golan and Parulski renders obvious this limitation. Ex.D, ¶¶161-162.

As discussed at [1.0] and [1.4], the combination of Golan and Parulski provides both still and video images using digital zooming based on user input zoom factor, which teaches "*obtaining zoom images of an object or scene in both still and video modes using a digital camera*" as recited in the claim. Ex.D, ¶162.

[12.1] a) providing in the digital camera a Wide imaging section having a Wide lens with a Wide field of view (FOV), a Wide sensor and a Wide image signal processor (ISP),

The combination of Golan and Parulski renders obvious this limitation for the reasons discussed at [1.1]. Ex.D, ¶163.

[12.2] [providing in the digital camera] a Tele imaging section having a Tele lens with a Tele FOV that is narrower than the Wide FOV, a Tele sensor and a Tele ISP, and

The combination of Golan and Parulski renders obvious this limitation for the reasons discussed at [1.2]. Ex.D, ¶164.

[12.3] [providing in the digital camera] a camera controller operatively coupled to the Wide and Tele imaging sections; and

Golan teaches this limitation for the reasons discussed at [1.3]. Ex.D, ¶165.

[12.4] b) configuring the camera controller to combine in still mode at least some of the Wide and Tele image data to provide a fused output image of the object or scene from a particular point of view, and to provide without fusion continuous zoom video mode output images of the object or scene, each output image having a respective output resolution,

The combination of Golan and Parulski renders obvious this limitation for the reasons discussed at [1.4]. Ex.D, ¶166.

[12.5] wherein the video mode output images are provided with a smooth transition when switching between a lower zoom factor (ZF) value and a higher ZF value or vice versa, and

The combination of Golan and Parulski renders obvious this limitation for the reasons discussed at [1.5]. Ex.D, ¶167.

[12.6] wherein at the lower ZF value the output resolution is determined by the Wide sensor while at the higher ZF value the output resolution is determined by the Tele sensor.

The combination of Golan and Parulski renders obvious this limitation for the reasons discussed at [1.6]. Ex.D, ¶168

12. Claim 13 would have been obvious over Golan and Parulski.

[13.0] The method of claim 12, wherein the step of configuring the camera controller to provide without fusion continuous zoom video mode output images of the object or scene includes configuring each sensor with a setting that depends on the Wide and Tele FOVs and on a sensor oversampling ratio.

The combination of Golan and Parulski renders obvious this limitation for the reasons discussed at [4.0]. Ex.D, ¶169.

13. Claim 14 would have been obvious over Golan and Parulski.

[14.0] The method of claim 13, wherein the Wide and Tele FOVs and the oversampling ratio satisfy the condition $0.8*PL_{WIDE}/PL_{video}<Tan(FOV_{Wide})/Tan(FOV_{Tele})<1.2*PL_{Wide}/PL_{video}$, wherein PL_{Wide} is an in-line number of Wide sensor pixels and wherein PL_{video} is an in-line number of output video format pixels.

Golan teaches this limitation for the reasons discussed at [5.0]. Ex.D, ¶170.

14. Claim 17 would have been obvious over Golan and Parulski.

[17.0] 17. The method of claim 12, wherein the step of configuring the camera controller to combine in still mode at least some of the Wide and Tele image data to provide a fused output image includes configuring the camera controller to combine Wide and Tele image data only in focused areas.

The combination of Golan and Parulski renders obvious this limitation. Ex.D, ¶¶171-177. In IPR2020-00861 and IPR2020-00862, the Board relied on the combination of Golan and Parulski to find unpatentable claims reciting similar features. Ex.S, IPR2020-00862, FWD, 69-72 (Board relying on the combination of Golan and Parulski to find unpatentable claim 22 of the '332 Patent reciting similar features); Ex.T, IPR2020-00861, 69-71 (Board relying on the combination of Golan and Parulski to find unpatentable claim 20 of the '898 Patent reciting similar features). Specifically, The Board agreed that "apply[ing] Parulski's teaching of still mode operation in which wide image and telephoto image are combined only in focused areas, which for a predetermined lossless zooming range, produces a fused output image having a broadened depth of field," teaches "to combine in still mode … Wide and Tele image data to provide a fused output image including configuring the camera controller to combine Wide and Tele image data only in focused areas." Ex.S, IPR2020-00862 FWD, 70-72.

First, as discussed in [1.4], the combination of Golan and Parulski renders obvious that the camera controller configured to combine in still mode at least some of the Wide and Tele image data to provide a fused output image of the object or scene from a particular point of view. Ex.D, ¶172.

Second, Parulski teaches configuring the camera controller, in still mode, to combine Wide and Tele image data only in focused areas to provide a fused output image, at zoom values both greater than and less than or equal to switch zoom position "X". Ex.G, Parulski, FIG. 14 (e.g., step 502); Ex.D, ¶173.

Specifically, as shown in FIG. 14 below, Parulski discloses that "an image is captured from the primary capture unit at **one focus position** and another image is captured from the scene analysis capture unit (the secondary image capture unit) at **another focus position**," and that "the two images are combined into a modified image with a **broadened depth of field**" where "the secondary still image is used to **sharpen portions of the primary still image that are positioned near the secondary focus distance**." Ex.G, Parulski, FIGS. 14, 26, 22:14-23:3, 28:45-56. As such, Parulski

teaches in still mode, combining Wide and Tele image data only in focused areas (e.g., sharp portions of Wide and Tele images positioned near their corresponding focus distances) to generate a fused output image with a broadened depth of field. *See, also, e.g.*, Ex.II, Jacobs, FIG. 12, 7 (providing "all-focus" images having "an extended depth of field" by combining focused areas in images with different focus distances). Ex.D, ¶174.

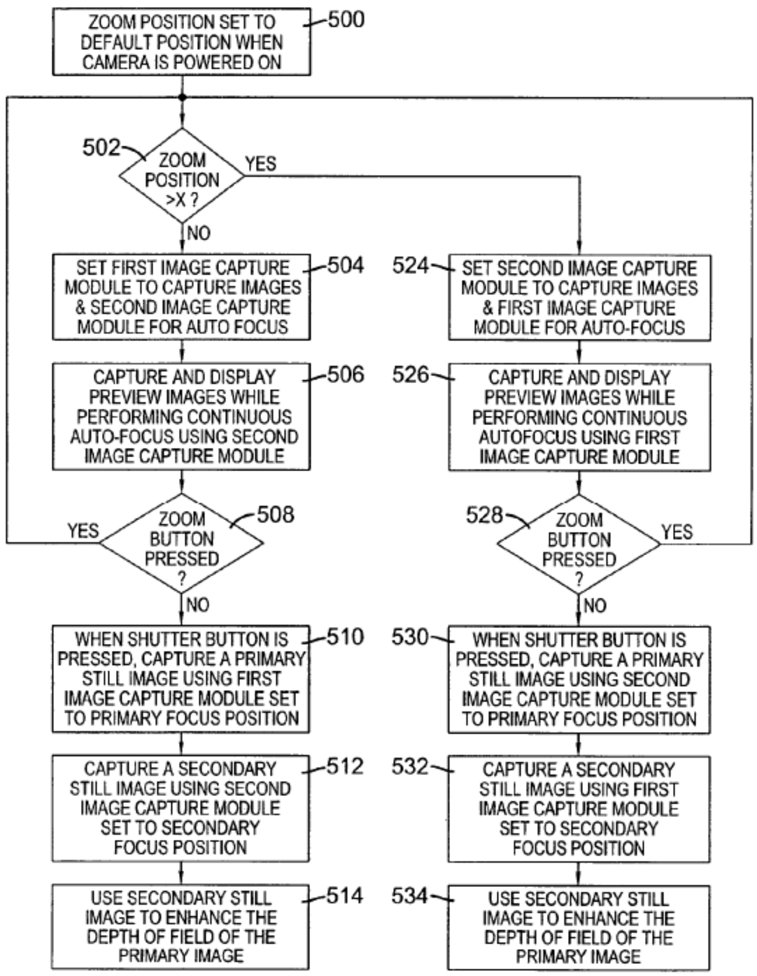


FIG. 14

Ex.G, Parulski, FIG. 14

Second, Golan teaches a predefined range of ZF values. Ex.F, Golan, [0009] ("Using two (or more) image sensors, having different fixed FOV, facilitates a light weight electronic zoom with a large lossless zooming range," with an example of a zoom range 36). A POSITA would

have understood that Golan's predefined large lossless zooming range applies to both still and video output images. Ex.D, ¶175.

Third, a POSITA would have been motivated to apply Parulski's teachings of in still mode, combining Wide and Tele image data only in focused areas to generate a fused output image in the system of Golan for the benefit of a fused output image having a broadened depth of field, at a predefined range of ZF values (e.g., the predefined lossless zooming range) in such a digital camera. Ex.G, Parulski, FIG. 14 (applying the method in a zooming range both less than and greater than switch zoom position "X"), 28:52-53, 29:4-7, 30:17-20; *see also* Proposed Rejection 1: Reasons to Combine Golan and Parulski. Ex.D, ¶176.

Thus, in the combination of Golan and Parulski, Golan's zoom control sub-system 100 is adapted to apply Parulski's teaching of still mode operation in which wide image and telephoto image are combined only in focused areas, which for a predetermined lossless zooming range, produces a fused output image having a broadened depth of field, which renders obvious [17.0]. Ex.D, ¶177.

B. Proposed Rejection 2: Claim 3 is unpatentable under §103 over Golan in view of Parulski, Levey, and Martin.

1. Summary of Levey

Levey is titled "automatic digital camera photography mode selection," and describes a "digital camera having a plurality of photography modes." Ex.M, Levey, Title, Abstract. Ex.D, ¶¶178-180.

Levey describes receiving a user input including a camera mode. Specifically, Levey describes that "a photography mode user interface for selecting between a plurality of photography modes, the **photography modes having associated image capture and image processing settings**." Ex.M, Levey, Abstract. Levey describes that its "graphical user interface displayed on the image display 32 is controlled in response to user input provided by user controls 34. The user controls 34 are used to select various camera modes, such as video capture mode, still capture mode, and review mode," and a "default mode." Ex.M, Levey, [0045], [0070]; Ex.D, ¶179.

Levey describes configuring its image sensor (*e.g.*, with timing generator 12) using image capture settings associated with the camera mode selected by the user, and examples of "various image capture settings" include lower/higher resolutions of sensor image data, "the exposure index, the lens F/#, the exposure time and the electronic flash setting," Ex.M, Levey, [0039], [0041], [0070], [0071]; Ex.D, ¶180.

2. Summary of Martin

Martin is directed to "critical alignment of parallax images for autostereoscopic display." Ex.L, Martin, Title. Ex.D, ¶¶181-184.

Specifically, Martin describes a method to "manipulate[ing] parallax images to create a resultant moving image" that "can be perceived to be three-dimensional without the use of special viewing aids." Ex.L, Martin, 1:18-20, 3:32-41. As shown in FIG. 1 below, Martin describes that cameras 10 and 12 are "displaced from each other" and capture respective parallax images "of a common scene 14." Ex.L, Martin, 3:39-46. It was well-known in the art that two images from neighboring apertures include parallax information (i.e., an apparent change in the position, direction of motion, or other visual characteristics of an object caused by different observational positions) of the object, and are referred to as parallax images. Ex.D, ¶182.

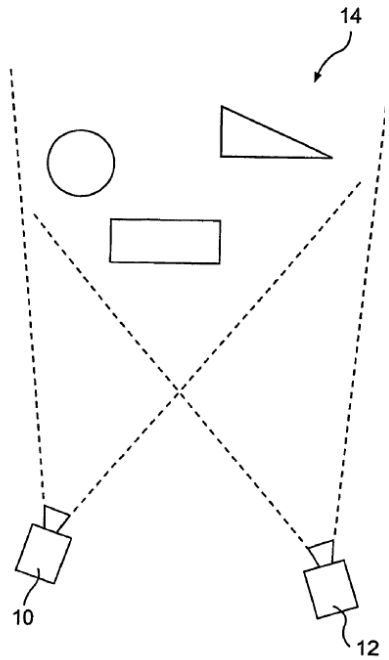
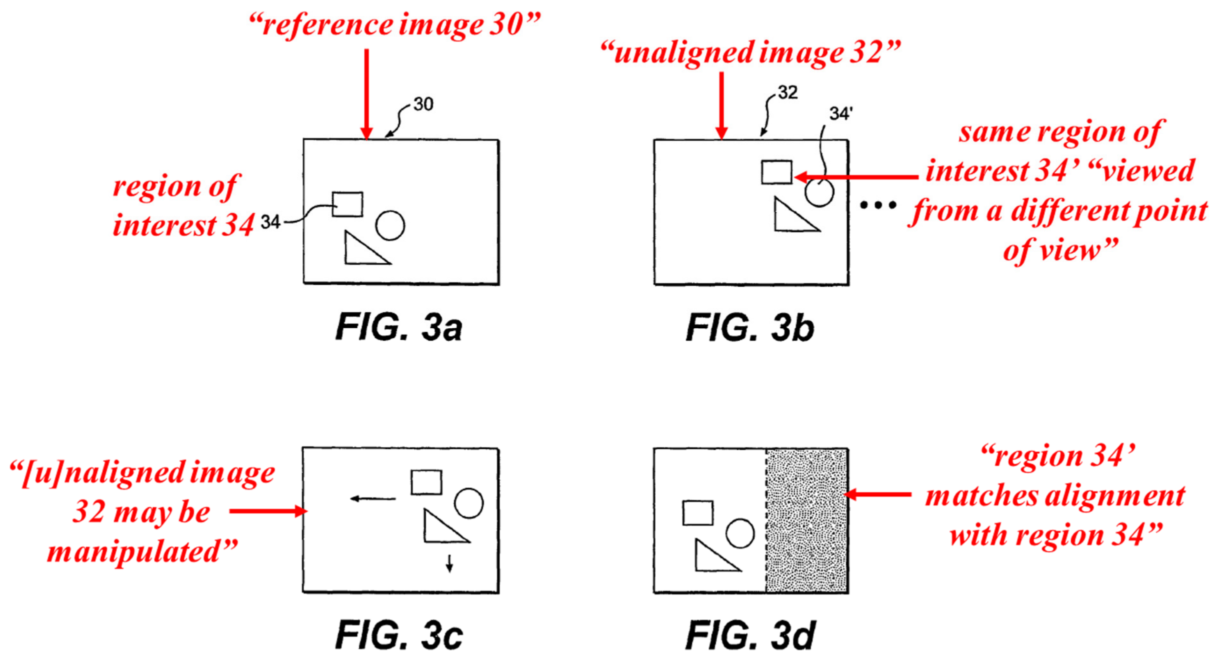


FIG. 1

Ex.L, Martin, FIG. 1

As shown in annotated FIGS. 3a-3d of Martin below, Martin describes that critical alignment is used to "achieve a stable autostereoscopic display" during the alternating display of parallax images, and explains that "[s]tability of the whole image may not be required, as long as at least a particular region of interest in the autostereoscopic display is stable." Ex.L, Martin, 5:53-58. Ex.D, ¶193.



Ex.L, Martin, FIGS. 3a-3d, annotated

Martin describes that "while displaying the images, aligning a user-selected region of interest associated with the first image with a corresponding region of interest of the second image such that said region of interest of the first image occupies in the display the same location as the region of interest in the second image." Ex.L, Martin, 7:36-51; Ex.D, ¶184.

3. Reasons to Combine Golan, Parulski, and Levey

A POSITA would have been motivated to apply Levey's teaching of receiving user inputs including a camera mode and configuring its image sensor (e.g., with timing generator 12) using image capture settings associated with the camera mode selected by the user in the combination of Golan and Parulski to produce the obvious, beneficial, and predictable results of providing a user a plurality of camera modes in a digital camera as taught by Levey. Ex.D, ¶¶185-189. The Board has previously found, consistent with the analysis here, in IPR2020-00861 and IPR2020-00862, that a POSITA would have combined Golan and Levey. Ex.S, IPR2020-00862 FWD, 59-63 (The Board stating, "We are persuaded that Golan discloses the user control module and the sensor control module in the claimed camera controller, Martin discloses 'a user-selected region of interest,' and Levey discloses 'wherein the user inputs

include a zoom factor, a camera mode and a region of interest' based on the cited portions of Golan and Levey. We are persuaded also that Petitioner's rationale for combining Golan, Martin, Togo, and Levey is supported by sufficient rational underpinning"); *see also* Ex.T, IPR2020-00861 FWD, 62.

First, the references are analogous prior art to the '291 Patent and are in the same field of endeavor pertaining to digital imaging systems generating still/video output images. Ex.D, ¶186. Similar to Golan combined with Parulski, Levey discusses a digital camera that "captures both motion video images and still images." Ex.M, Levey, [0032]. Similarly, Golan considers digital cameras providing "digital still or video images." Ex.F, Golan, [0003].

Second, a POSITA would have been motivated to incorporate Levey's teaching of providing user input including a camera mode and configuring its image sensor to acquire the image based on a user input including a camera mode in the combination of Golan and Parulski. Ex.D, ¶187. A POSITA would understand such a combination to produce the obvious, beneficial, and predictable results of providing a plurality of camera modes "that can be selected by the user to control various elements of the image capture process and the image processing chain." Ex.M, Levey, [0004]. A POSITA designing a zoom camera would be motivated to provide the ability for users to take images of various camera modes (e.g., video, still, portrait, landscape, etc.). In many applications, digital cameras were expected by the priority date of the '291 patent to support different camera modes capture. *See, e.g.*, Ex.KK, Kodak EasyShare V610, 1-13.

Showing camera modes including movie/video mode (last mode to the upper

right) and various still modes (Av, Tv, P, Auto, etc.)

Third, combining the teachings of Levey with the system of Golan and Parulski would have produced operable results that are predictable. Ex.D, ¶188. Specifically, combining Levey's teaching of providing user input including a camera mode and configuring its image sensor to acquire the image based on a user input including a camera mode in the digital camera of Golan, Martin, and Togo would have been no more than the combination of known elements according to known methods (such as providing a photography mode user interface for selecting between a plurality of camera modes in the digital camera of Golan and Parulski, and configuring each of the Wide and Tele sensors to acquire the Wide and Tele images based on image capture settings associated with the user selected camera mode), and would have been obvious to a POSITA to achieve the benefits of providing a user a plurality of camera modes described by Levey.

The combination of Levey's teaching with the digital camera of Golan and Parulski does not require physical incorporation of Levey's user interface or sensor control circuitry into the digital camera of Golan and Parulski. Ex.D, ¶189. Furthermore, while Levey describes a digital camera including an image sensor, a POSITA would have understood that Levey's teachings of configuring its image sensor based on a user input including a camera mode apply to a digital camera including multiple image sensors as taught in Golan combined with Parulski. *See, e.g.*, Ex.KK, Kodak EasyShare V610, 5-15. To the extent that any modification would have been needed to the system of Golan combined with Parulski in order to accommodate the teachings of Levey, such modifications would have been within the level of ordinary skill in the art. Ex.D, ¶189.

4. Reasons to Combine Golan, Parulski, Levey, and Martin

A POSITA would have been motivated to apply Martin's teachings of user inputs including region of interest in the digital camera of Golan, Parulski, and Levey to produce the obvious, beneficial, and predictable results of providing the ability for users to have better control of the image capture process. Ex.D, ¶¶190-193. The Board has previously found, consistent with the analysis here, in IPR2020-00861 and IPR2020-00862, that a POSITA would have combined Golan, Martin, and Levey. Ex.S, IPR2020-00862 FWD, 59-63 (Board stating, "We are persuaded that Golan discloses the user control module and the sensor control module in the claimed camera controller, Martin discloses 'a user-selected region of interest,' and Levey

discloses 'wherein the user inputs include a zoom factor, a camera mode and a region of interest' based on the cited portions of Golan and Levey. We are persuaded also that Petitioner's rationale for combining Golan, Martin, Togo, and Levey is supported by sufficient rational underpinning"); *see also* Ex.T, IPR2020-00861 FWD, 62.

First, the references are analogous prior art to the '291 Patent and are in the same field of endeavor pertaining to imaging systems generating video output images using images from two imaging sections having different points of view. Ex.D, ¶191. Golan discloses providing continuous video output images using an image acquisition system "having multiple imaging devices" having different points of view. Ex.F, Golan, FIG. 1, [0009], [0036]; *see also id.*, Abstract, [0015]. Similarly, Martin discusses "display [of] alternating views of two or more parallax images" from cameras having different points of view to "create a resultant moving image." Ex.L, Martin, FIG. 1, 3:6-13, 3:32-35.

Second, a POSITA would have been motivated to incorporate Martin's teachings of user input region of interest in the combination of Golan, Parulski, and Levey to produce the obvious, beneficial, and predictable results of allowing the user to better control the image capture process, e.g., better indicating an autofocus area, using the user input region of interest. Ex.D, ¶192.

Third, combining the teachings of Martin with the system of Golan, Parulski, and Levey would have produced operable results that are predictable. Specifically, combining Martin's teaching of user input region of interest in the digital camera of Golan, Parulski, and Levey would have been no more than the combination of known elements according to known methods (such as providing a user interface for selecting a region of interest to indicate an autofocus area). Ex.D, ¶193.

5. Claim 3 would have been obvious over Golan, Parulski, Levey, and Martin.

[3.0] The camera of claim 2, wherein the user inputs include a zoom factor, a camera mode and a region of interest (ROI).

The combination of Golan, Parulski, Levey, and Martin renders obvious this limitation. Ex.D, ¶¶194-202. The Board has previously found, consistent with the analysis here, in IPR2020-00861 and IPR2020-00862, the combination of Golan, Martin, and Levey teaches this

limitation. Ex.S, IPR2020-00862 FWD, 59-63 (Board finding unpatentable claim 10 of the '332 Patent reciting a similar features, stating, "We are persuaded that Golan discloses the user control module and the sensor control module in the claimed camera controller, Martin discloses 'a user-selected region of interest,' and Levey discloses 'wherein the user inputs include a zoom factor, a camera mode and a region of interest' based on the cited portions of Golan and Levey. We are persuaded also that Petitioner's rationale for combining Golan, Martin, Togo, and Levey is supported by sufficient rational underpinning"); Ex.T, IPR2020-00861 FWD, 58-62 (Similarly, Board finding unpatentable claim 9 of the '898 Patent reciting similar features relying on Golan, Martin, and Levey's teachings).

First, as discussed at [2.0], the combination of Golan and Parulski discloses that the user control module is configured to receive user inputs including zoom factor user inputs. Ex.D, ¶195.

Second, Levey describes receiving a user input including a camera mode. Ex.D, ¶196. Specifically, Levey describes that "a photography mode user interface for selecting between a plurality of photography modes, the **photography modes having associated image capture and image processing settings**." Ex.M, Levey, Abstract. Levey describes that its "graphical user interface displayed on the image display 32 is controlled in response to user input provided by user controls 34. The user controls 34 are used to select various camera modes, such as video capture mode, still capture mode, and review mode," and a "default mode." Ex.M, Levey, [0045], [0070]. Furthermore, Levey describes configuring its image sensor (e.g., by timing generator 12) using image capture settings associated with the camera mode selected by the user, and examples of "various image capture settings" include lower/higher resolutions of sensor image data, "the exposure index, the lens F/#, the exposure time and the electronic flash setting." Ex.M, Levey, [0039], [0041], [0070], [0071].

Third, it was well-known that Martin describes that receiving a user input including a region of interest. Ex.D, ¶197. Specifically, Martin describes that "while displaying the images, aligning a **<u>user-selected region of interest</u>** associated with the first image with a corresponding region of interest of the second image such that said region of interest of the first image occupies in the display the same location as the region of interest in the second image." Ex.L, Martin, 7:36-51; *see also* (Ex.S), IPR2020-00862 FWD, 59-62 (finding that "Martin discloses 'a user-selected region of interest'").

It is noted that the '291 Patent provides that "'ROI' is a user defined as a[sic] sub-region of the image" and "is the region on which both sub-cameras are focused on." Ex.A, 6:25-28. Ex.D, ¶198.

Like the '291 Patent, each of Levey and Parulski teaches "an autofocus system" in a digital camera, and it was well-known in the art to provide user inputs as an autofocus reference point to allow a user to control the focus area/region of interest. Ex.G, Parulski, 1:20-23; Ex.M, Levey, [0003] ("Digital cameras with a multitude of operational features including but not limited to exposure control, white balance, **auto focus**, etc. have been a consumer staple for decades."). As such, a POSITA would have been motivated to apply Martin's teachings of an ROI user input in the combination of Golan, Parulski, and Levey, to enable a user to more accurately select an autofocus reference point. Ex.D, ¶199.

A POSITA would have understood that in the digital camera of Golan, Parulski, Levey, and Martin, the region of interest may be defined by a user through a user input of the digital camera, including a user-selected autofocus reference point indicating a region of interest on which the Wide and Tele imaging sections are focused on. Ex.D, ¶200; *see* e.g., Ex.G, Parulski, 5:37-38, 7:36-51. *See also* Proposed Rejection 2: Reasons to Combine Golan, Parulski, and Levey and Reasons to Combine Golan, Parulski, Levey, and Martin; *see also e.g.*, Ex.M, Levey, Abstract (it was well-known in the art to provide "a photography mode user interface for selecting between a plurality of photography modes," and configure its image sensor using associated image capture settings).

Thus, in the combination of Golan, Parulski, Levey, and Martin, a camera includes a camera control including a user control module for receiving, from a user interface, user inputs including a required zoom factor, a camera mode, and a region of interest. Further, the camera controller includes a sensor control module for configuring each sensor to acquire the Wide and Tele images based on the user inputs (e.g., according to the required zoom factor, region of interest for focusing, and image capture settings associated with the selected camera mode). *See also, e.g.*, Ex.M, Levey, Abstract ("a **photography mode user interface** for selecting between a plurality of photography modes," and configuring its image sensor using associated image capture settings was well-known); Ex.D, ¶201.

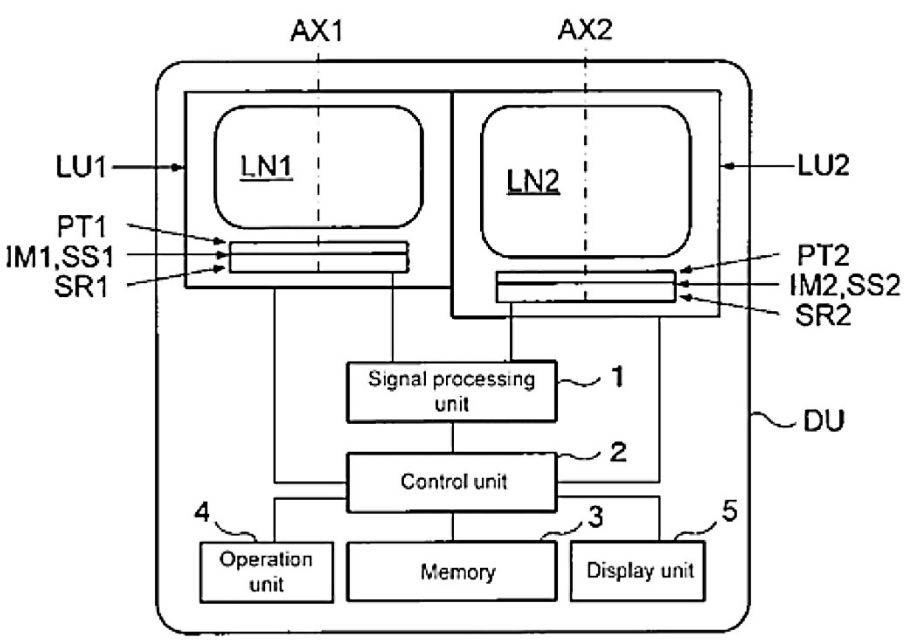
Accordingly, the combination of Golan, Parulski, Levey, and Martin renders obvious that "*the user inputs include a zoom factor, a camera mode and a region of interest (ROI)*," as recited in the claim. Ex.D, ¶202.

D. Proposed Rejection 3: Claim 7 is unpatentable under §103 over Golan in view of Parulski and Konno.

1. Summary of Konno

Like the '291 Patent, Golan, and Parulski, Konno describe digital zooming using images from fixed focal length wide range and telephoto lenses to provide a broad zoom range. Ex.D, ¶203. To provide "a high-performance thin and small-sized imaging apparatus" with a broad zoom range, as shown in FIG. 21 below, Konno teaches "[a]n imaging apparatus includes single-focus first and second imaging optical systems LN1 and LN2 that face the same direction" and have different focal lengths. Ex.K, Konno, Solving Means, [0049].

[FIG. 21]



Ex.K, Konno, FIG. 21

2. Motivation to Combine Konno with Golan and Parulski

A POSITA would have been motivated to combine the teachings of Konno with the system(s) taught in combination by Golan and Parulski to obtain the benefits of a dual-lens high-performance thin and small-sized imaging apparatus with a wide zoom range at low costs. Ex.D, ¶¶204-207.

First, the references are analogous prior art and are in the same field of endeavor (digital imaging systems). Ex.K, Konno, Solving Means, [0002], [0049]; Ex.D, ¶205.

Second, Parulski explicitly suggests the motivation to provide a camera with reduced size and cost. Ex.D, ¶206. Parulski describes that its dual-lens zoom digital camera "provides an **<u>improved imaging capability</u>** without unduly increasing the **<u>size or cost</u>**" and may be integrated into a camera phone. Ex.G, Parulski, 8:13-16. Golan and Parulski teach use of wide and tele sensors, but do not teach the detailed lens designs. A POSITA would have looked to lens designs for mobile phones considering reduced size and cost. Konno teaches various optical system designs to obtain a dual-lens "**high-performance <u>thin and small-sized</u>** imaging apparatus capable of acquiring an image of **<u>high quality and high resolution</u>**" that "can be realized at **<u>low costs</u>**" and used in "mobile phones." Ex.K, Konno, [0002], [0006], [0017], [0046]. For example, Konno teaches a telephoto ratio condition (e.g., between 0.7 and 1.0) to achieve balanced performance and size of second imaging optical system LN2, and various lens element configurations (e.g., five lens elements configurations for both wide and tele lenses). Ex.K, Konno, FIGS. 11, 16, [0007], [0040]-[0041].

Accordingly, in the design of the system of Golan and Parulski, a POSITA would have looked to Konno's teachings of imaging optical system designs to obtain a dual-lens high-performance thin and small-sized imaging apparatus with a wide zoom range at low costs. Ex.D, ¶207.

3. Claim 7 would have been obvious over Golan, Parulski, and Konno.

[7.0] The camera of claim 6, wherein each lens includes five lens elements.

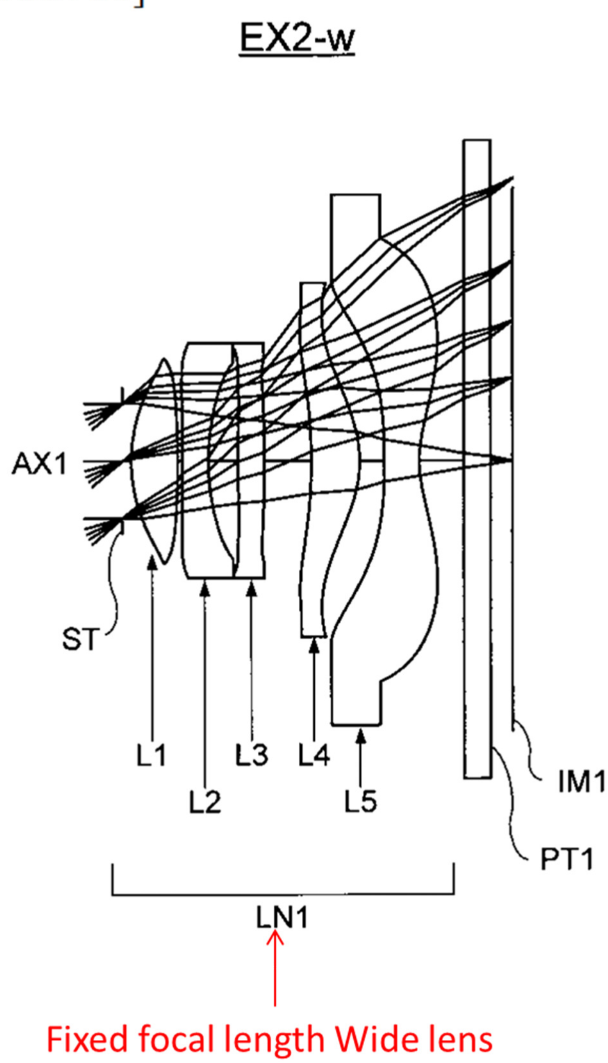
The combination of Golan, Parulski, and Konno renders obvious this limitation. Ex.D, ¶¶208-215.

First, Konno teaches that first imaging optical system LN1 is a fixed focal length Wide lens, and that second imaging optical system LN2 is a fixed focal length Tele lens. Ex.D, ¶209; Ex.K, Konno, Solving Means, [0049].

Second, Konno explains that "Examples 1 and 2 (EX1, 2) are numerical examples corresponding to the first and second embodiments, respectively," (Ex.K, Konno, [0057]), and FIGS. 11 and 16 illustrate LN1 and LN2 in Example 2 (EX2) that are examples of fixed focal length wide and tele lenses in the imaging system of Figure 21 above. Ex.K, Konno, [0055]; Ex.D, ¶210.

Third, Konno teaches that LN1 includes five lens elements. Ex.D, ¶211. Specifically, as shown in FIG. 11 below, Konno's LN1 in EX2 includes five lens elements L1, L2, L3, L4, and L5. Ex.K, Konno, FIG. 11, [0056].

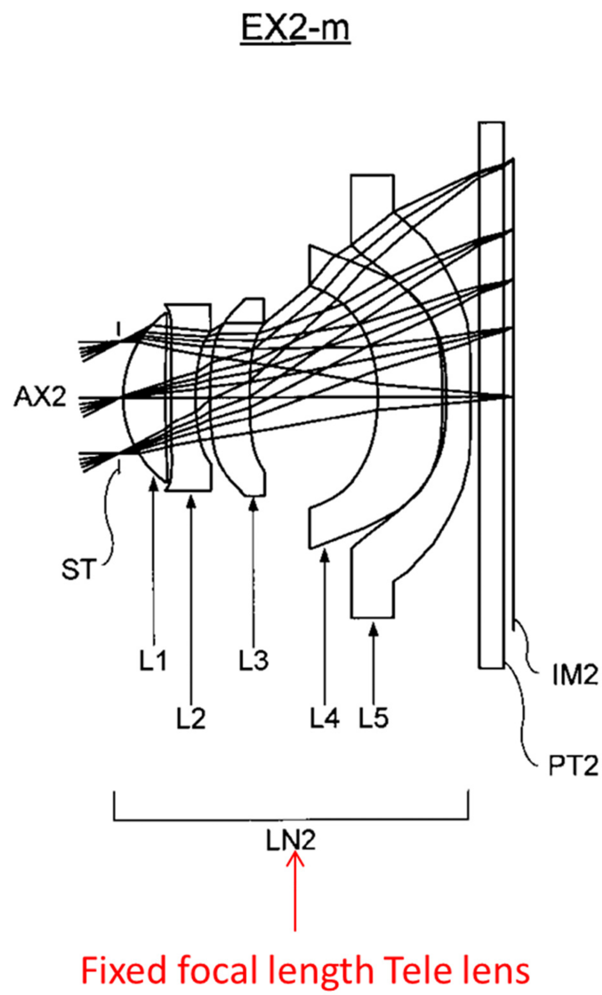
[FIG. 11]



Ex.K, Konno, FIG. 11, annotated

Fourth, Konno teaches that LN2 includes five lens elements. Ex.D, ¶212. Specifically, as shown in FIG. 16 below, Konno's LN2 in EX2 includes five lens elements L1, L2, L3, L4, and L5. Ex.K, Konno, FIG. 16, [0056].

[FIG. 16]



Ex.K, Konno, FIG. 16, annotated

It would have been obvious for a POSITA to use five lens elements in each of the fixed focal length Wide lens and fixed focal length Tele lens in the combination of Golan, Parulski, and Konno, as taught by Konno, to obtain the benefit of "compensating field curvature and chromatic aberration" for the fixed focal length Wide lens, and "a high telephoto property ... advantageous for reducing the entire length" for the fixed focal length Tele lens. Ex.K, Konno,

[0036]. *See also* Proposed Rejection 3: Reasons to Combine Konno with Golan and Parulski; Ex.D, ¶213.

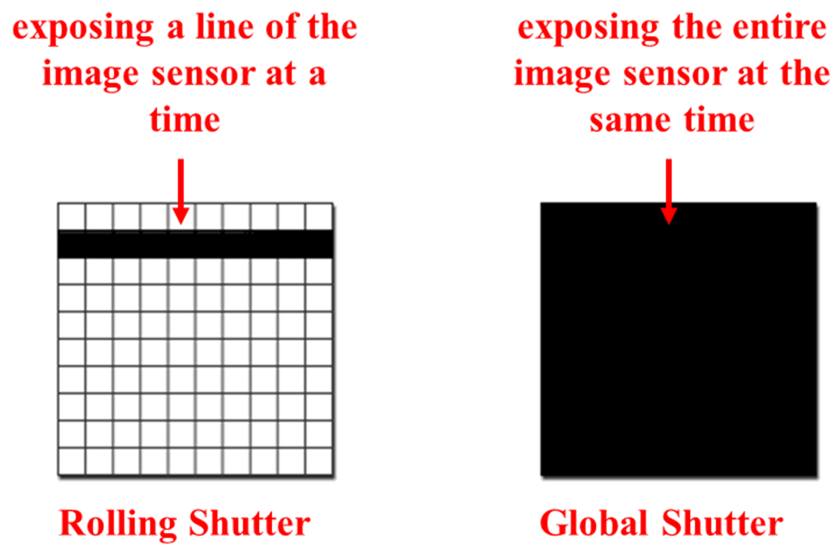
PO may incorrectly argue that in Konno, LN2 in EX2 would not have been obvious to combine because LN2 includes a mistake in that two of the lens elements are overlapping, and as such, Konno is not enabled. However, the enabling disclosure requirement applies only to anticipation, not obviousness. *See Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1357 (Fed. Cir. 2003) ("Under § 103 … a reference need not be enabled; it qualifies as a prior art, regardless, for whatever is disclosed therein"). Further, it would have been obvious to a POSITA to correct this minor mistake in Konno for a combination with Konno. Dr. Durand has reviewed the opinion of Dr. Sasian in that proceeding and agrees that it would have been obvious for a POSITA to apply the teachings of LN2 of Konno, which would include correcting the minor error in the lens design specifications for LN2. Ex.D, ¶214; Ex.NN, IPR2018-01146 Sasian Declaration, ¶¶64-65; see also Ex.LL, CAFC Decision re: IPR2018-01146, 15 (Fed. Cir. vacating the Board's determination that claims 6 and 14 of Patent No. 9,568,712 would not have been obvious in view of a combination with Konno, effectively affirming that it would have been obvious to a POSITA to correct the minor mistake in Konno for a combination therewith); Ex.MM, IPR2018-01146 Adverse Judgement, 4-5 (Patent Owner disclaimed claims 6 and 14 after the Fed. Cir. vacated the Board's determination).

Therefore, in the combination of Golan, Parulski, and Konno, each of the fixed focal length Wide lens and fixed focal length Tele lens of a digital camera includes five lens elements, which renders obvious that "*each lens includes five lens elements*," as recited in the claim. Ex.D, ¶215.

E. Proposed Rejection 4: Claim 22 is unpatentable under §103 over Golan in view of Parulski and Baer.

1. Summary of Baer

Baer discloses providing "low-power CMOS image sensors for stereo imaging." Ex.O, Baer, FIG. 1, Title, 1:49-54. Baer provides, while CCD image sensors use a global shutter, CMOS image sensors "**collect an image a line at a time using a rolling shutter**," and therefore, have a need for synchronization. Ex.O, Baer, 2:28-40. Ex.D, ¶¶216-217.



To address this issue, Baer provides "low-power CMOS image sensors for stereo images" where "**the rolling shutters of the pair of CMOS image sensors in a stereo imaging system are synchronized** to acquire **corresponding lines of the images** at the same time." Ex.O, Baer, 2:46-49. As such, Baer's CMOS image sensors are synchronized so that the rolling shutter starts substantially the same time for both sensors for acquiring "the corresponding lines of the images," including the first lines. Ex.D, ¶217.

2. Reasons to Combine Baer with Golan and Parulski

A POSITA would have been motivated to apply Baer's teaching of image sensor synchronization in the combination of Golan and Parulski to produce the obvious, beneficial, and predictable results that two low-power CMOS image sensors "are synchronized and the image acquisition is simultaneous" as taught by Baer, "since differences between the two images due to **motion of the camera** or **motion within the scene** are avoided." Ex.O, Baer, 2:62-65, 6:11-18; Ex.N, Border, [0015]; Ex.D, ¶¶218-222. In IPR2020-00860, the Board confirmed the combination of Golan and Baer for invalidating claims reciting similar features. Ex.R, IPR2020-00860, FWD, 74-76 (Board relying on the combination of Golan and Baer to invalid claims 10, 14, and 16 of the '942 Patent reciting similar features to "synchronize the Wide and Tele sensors so that a rolling shutter starts substantially the same time for both sensors").

First, like the '291 Patent, each of Golan, Parulski, and Baer pertains to digital imaging systems including two image sensors for capturing two images of the same scene having

different points of view. Ex.O, Baer, 1:7-9;5:59-60. As discussed previously, it was well-known in the art that two images from neighboring apertures include parallax information (i.e., an apparent change in the position, direction of motion, or other visual characteristics of an object caused by different observational positions) of the same object/scene. As such, there images are referred to as parallax images. Ex.D, ¶219.

Second, like the '291 Patent, Golan, and Parulski, Baer teaches the need to capture two images simultaneously, which reduces "error due to motion of the subjects in the image." Ex.O, Baer, 2:62-65. Ex.D, ¶220.

Third, combining Baer's teachings of image sensor synchronization in the digital camera of Golan combined with Parulski would have been no more than the combination of known elements according to known methods (such as synchronizing Wide and Tele sensors implemented with lower-power CMOS sensors) to achieve the benefits of acquiring images simultaneously as described in Baer for providing a fused output image in the still mode with reduced image processing complexities. Ex.D, ¶221.

Finally, Baer's teachings of image sensor synchronization (e.g., in providing three-dimensional images) apply to the digital camera of Golan combined with Parulski (e.g., in still mode to provide a fused image), regardless of whether three-dimensional images are provided as in Baer, because the shared goal to capture two images simultaneously remains the same. Ex.D, ¶222.

3. *Claim 22 would have been obvious over Golan, Parulski, and Baer.*

[22.0] The method of claim 12, wherein the step of configuring the camera controller to combine in still mode at least some of the Wide and Tele image data to provide a fused output image includes configuring the camera controller to synchronize the Wide and Tele sensors to force the two sensors to start exposure at the same time.

Golan combined with Parulski and Baer renders obvious this limitation. Ex.D, ¶¶223-226. In IPR2020-00860, the Board confirmed the combination of Golan and Baer for invalidating claims reciting similar features. Ex.R, IPR2020-00860, FWD, 74-76 (Board relying on the combination of Golan and Baer to invalid claim 10 of finding claims 10, 14, and 16 of the '942 Patent reciting similar features).

Baer teaches synchronizing stereo sensors so that a rolling shutter starts substantially the same time for both sensors. Ex.D, ¶224. Specifically, to provide "low-power CMOS image sensors for stereo images," Baer teaches that "**the rolling shutters of the pair of CMOS image sensors in a stereo imaging system are synchronized** to acquire **corresponding lines of the images** at the same time," which teaches that a rolling shutter starts at substantially the same time for both sensors for acquiring corresponding first lines of the images at the same time. Ex.O, Baer, 2:46-49; 6:11-15; 5:57-59. Baer teaches that the sensors may be synchronized "with a common clock signal" or with two clock signals having an "offset by one half of a clock period." Ex.O, Baer, 4:61-62; 3:44-50.

A POSITA would have been motivated to apply Baer's teachings of sensor synchronization in the digital camera of Golan and Parulski, such that in the still mode, the Wide and Tele images are captured substantially simultaneously by corresponding CMOS Wide and Tele sensors, for generating a fused output image, which achieves the benefit of reduced complexities in the image processing "since differences between the two images due to **motion of the camera** or **motion within the scene** are avoided." Ex.O, Baer, 2:62-65, 6:11-18; Ex.N, Border, [0015]; *see also* Proposed Rejection 4: Reasons to Combine Baer with Golan and Parulski; Ex.D, ¶225.

Therefore, the digital camera of Golan, Parulski, and Baer includes a camera controller configured to, when in still mode, synchronize Wide and Tele lower-power CMOS sensors so that a rolling shutter starts substantially the same time for both sensors to capture Wide and Tele images substantially simultaneously to provide a fused output image, which teaches [22.0]. Ex.D, ¶226.

VIII. LIST OF EXHIBITS

Exhibit A	U.S. Patent No. 9,185,291 to Shabtay et al. (the "'291 Patent")
Exhibit B	Prosecution File History of the '291 Patent (the "'711 App")
Exhibit C	Prosecution File History of U.S. Provisional App. No. 61/834486 ("'486 App")
Exhibit D	Declaration of Dr. Fredo Durand ("Durand")
Exhibit E	Curriculum Vitae of Dr. Fredo Durand
Exhibit F	U.S. Patent Application Publication No. 2012/0026366 to Golan et al. ("Golan")
Exhibit G	U.S. Patent No. 7,859,588 ("Parulski")
Exhibit H	U.S. Patent No. 8,553,106 to Scarff ("Scarff")
Exhibit I	Richard Szeliski, Computer Vision: Algorithms and Applications, 2011 ("Szeliski")
Exhibit J	Japanese Patent Application Pub. No. JP2013106289 to Konno et al. ("Konno Japanese")
Exhibit K	Japanese Patent Application Pub. No. JP2013106289 to Konno et al., Certified English translation ("Konno")
Exhibit L	U.S. Patent No. 8,081,206 to Martin et al. ("Martin")
Exhibit M	U.S. Patent App. Pub. No. 2012-0019704 to Levey ("Levey")
Exhibit N	U.S. Patent Application Publication No. US 2008/0030592 to Border et al. ("Border"),
Exhibit O	U.S. Patent No. 7,112,774 to Baer ("Baer")
Exhibit P	U.S. Patent Application Publication No. 2009/0295949 to Ojala ("Ojala")
Exhibit Q	IPR2020-00487 (IPR for '233 Patent), Paper 57, Final Written Decision ("IPR2020-00487 FWD")
Exhibit R	IPR2020-00860 (IPR for '942 Patent), Paper 51, Final Written Decision ("IPR2020-00860 FWD")
Exhibit S	IPR2020-00862 (IPR for '332 Patent), Paper 35, Final Written Decision ("IPR2020-00862 FWD")

Exhibit T	IPR2020-00861 (IPR for ’898 Patent), Paper 35, Final Written Decision (“IPR2020-00861 FWD”)
Exhibit U	Apple Inc. v. Corephotonics Ltd., Case No. 17-CV-06457-LHK, Order Staying Cases
Exhibit V	IPR2018-01348 (IPR for ’291 Patent), Paper 2, Petition
Exhibit W	IPR2018-01348 (IPR for ’291 Patent) Patent Owner's Preliminary Response
Exhibit X	IPR2018-01348 (IPR for ’291 Patent), Paper 9, Decision Denying Institution
Exhibit Y	U.S. Patent No. 9,549,123 to Ninan et al. (“Ninan”)
Exhibit Z	U.S. Patent No. 7,777,972 to Chen et al. (“Chen”)
Exhibit AA	U.S. Patent Application Publication No. 2011/0001838 to Lee (“Lee”)
Exhibit BB	Eastman Kodak Company, “Kodak Digital ScienceTM KAC –1310 1280 x 1024 SXGA CMOS Image Sensor,” 2002 (“KAC-1310”)
Exhibit CC	Ralph E. Jacobson et al., The Manual of Photography: photographic and digital imaging, 9th Edition, 2000 (“Jacobson”)
Exhibit DD	U.S. No. 9,661,233 to Shabtay et al. (“Shabtay ’233 Patent”)
Exhibit EE	U.S. No. 10,326,942 to Shabtay et al. (“Shabtay ’942 Patent”)
Exhibit FF	U.S. No. 10,356,332 to Cohen et al. (“’332 Patent”)
Exhibit GG	U.S. No. 10,230,898 to Cohen et al. (“’898 Patent”)
Exhibit HH	Warren J. Smith, MODERN LENS DESIGN (1992) (“Smith”)
Exhibit II	Jacobs et al., “Focal Stack Compositing for Depth of Field Control,” Stanford Computer Graphics Laboratory Technical Report 2012-1 (“Jacobs”)
Exhibit JJ	U.S. Patent No. 8,941,706 to Guo et al. (“Guo”)
Exhibit KK	Kodak EasyShare V610 dual lens digital camera manual, 2006 (“Kodak EasyShare V610”)
Exhibit LL	Apple Inc. v. Corephotonics Ltd., Case No. 20-1438 (Fed. Cir. 2021) (“ CAFC Decision re: IPR2018-01146”)

Exhibit MM	IPR2018-01146 (IPR for Patent 9,568,712), Paper 45, Adverse Judgement ("IPR2018-01146 Adverse Judgement")
Exhibit NN	IPR2018-01145 (IPR for Patent 9,568,712), Exhibit 1003, Sasian Declaration ("IPR2018-01146 Sasian Declaration")

IX. CONCLUSION

For the reasons set forth above, substantial new questions of patentability are raised in connection with Challenged Claims, by this Request for *Ex Parte* Reexamination, because Challenged Claims are rendered obvious in view of the above-listed prior art references. Therefore, Requester asks that this request for reexamination be granted and that Challenged Claims be canceled.

As identified in the attached Certificate of Service and in accordance with 37 C.F.R. §§ 1.33(c) and 1.510(b)(5), a copy of the present Request, in its entirety, is being served to the address of the attorney or agent of record.

Please direct all correspondence in this matter to the undersigned.

Respectfully submitted,

March 23, 2022

/David W. O'Brien/

David O'Brien

Counsel for Third Party Requester

Registration No. 40,107

CERTIFICATE OF TRANSMISSION

I hereby certify that this correspondence is being filed with the U.S. Patent and Trademark Office via EFS Web on March 23, 2022.

/Krista Myrick/
Krista Myrick

X. CERTIFICATE OF SERVICE

The undersigned certifies that copies of the following,

(1) Request for Ex Parte Reexamination Transmittal Form;

(2) PTO 1449 Modified Form;

(3) Request for Ex Parte Reexamination Under 35 U.S.C. §§ 302-306; and

(4) Exhibits A-NN

in their entirety were served on:

Nathan, Menachem
Nathan & Associates Patent Agents Ltd
P.O.Box 10178
Tel Aviv 6110101

the attorney of record for the assignee of U.S. Patent No. 9,185,291, in accordance with 37 C.F.R. § 1.510(b)(5), on the 23rd day of March, 2022.

Dated: March 23, 2022

/David W. O'Brien/
David O'Brien
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Registration No. 40,107